JAN 6 1954

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the Iron Age

THE NATIONAL METALWORKING WEEKLY

December 31, 1953

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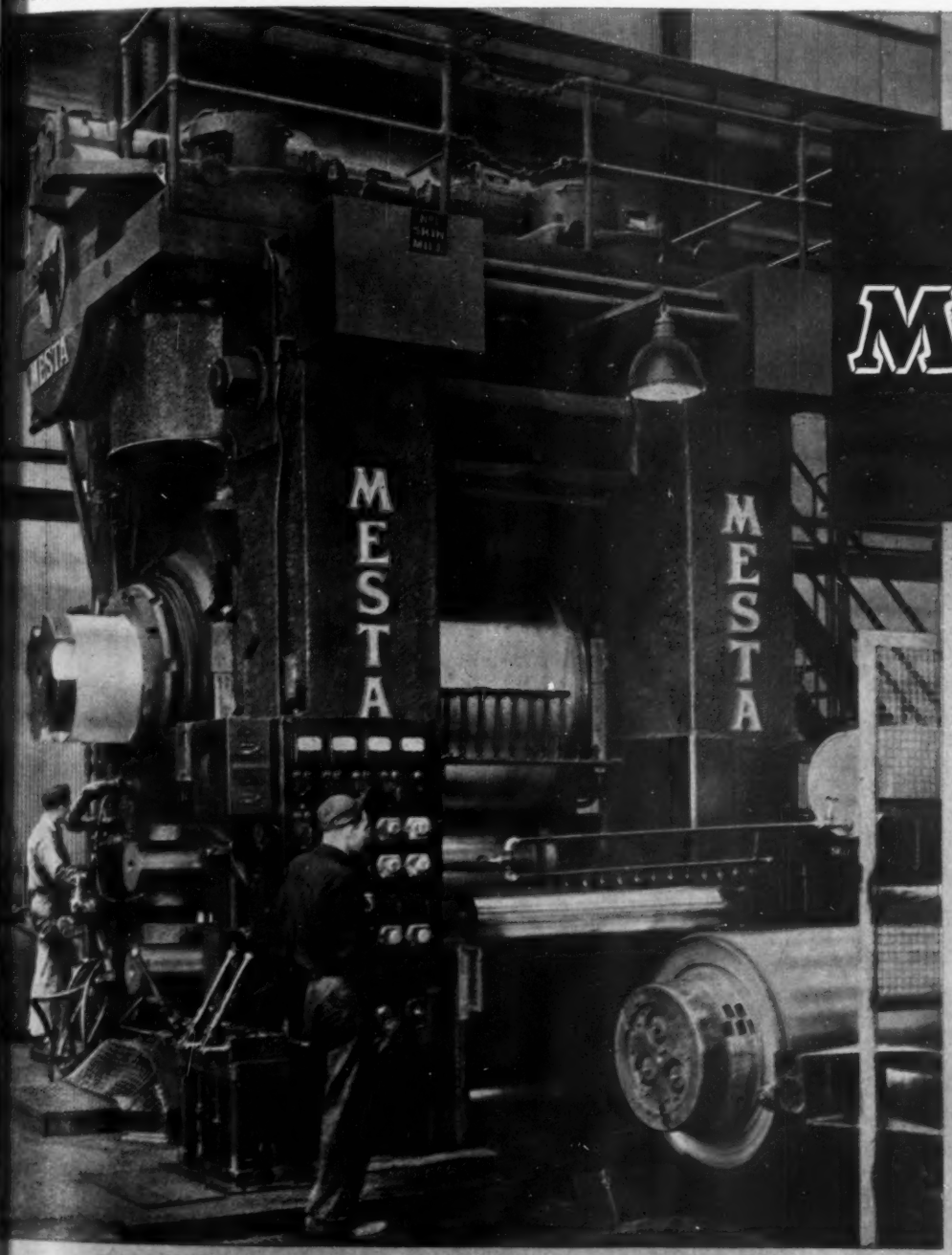
MESTA



Mesta 56" Four-High Temper Mill

higher speed COLD MILLS

DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE COMPANY • PITTSBURGH, PA.

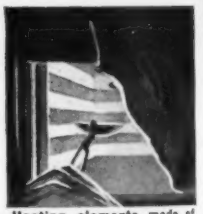
How Hot can a Jet Get?

Whoooosshh! Jet engines generate a powerful amount of heat . . . heat which, uncontrolled in flight, would cause disastrous metallurgical distortions within the delicately balanced engine. So the problem is . . . or rather *was* . . . how to provide a dependably accurate means of measuring exhaust temperatures so that the pilot might have control over how hot his jets get.

And the answer? Special wiring harnesses running from engine to instrument panel . . . harnesses now made exclusively with Hoskins Chromel-Alumel thermocouple alloys.

Yes, wherever durability and accuracy are required in a thermocouple . . . whether for jet engines or industrial furnaces . . . you'll find Chromel-Alumel *right* for the job. Extremely durable . . . highly resistant to heat, corrosion, oxidation . . . guaranteed to register true temperature-E.M.F. values within specified close limits.

That's only part of Hoskins' product picture, though. Other specialized quality-controlled alloys developed and produced by Hoskins include: Alloy 785 for brazing belts; Alloy 717 for facing engine valves; special alloys for spark plug electrodes; Alloy 502 for heat resistant mechanical applications. And, of course, there's Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.



Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.

Sparks fly better, last longer in today's spark plugs . . . thanks to Hoskins' spark plug electrode alloys.

Hot stuff for hot jobs! Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.

Chromel® NICKEL CHROMIUM WIRE

HOSKINS

MANUFACTURING COMPANY

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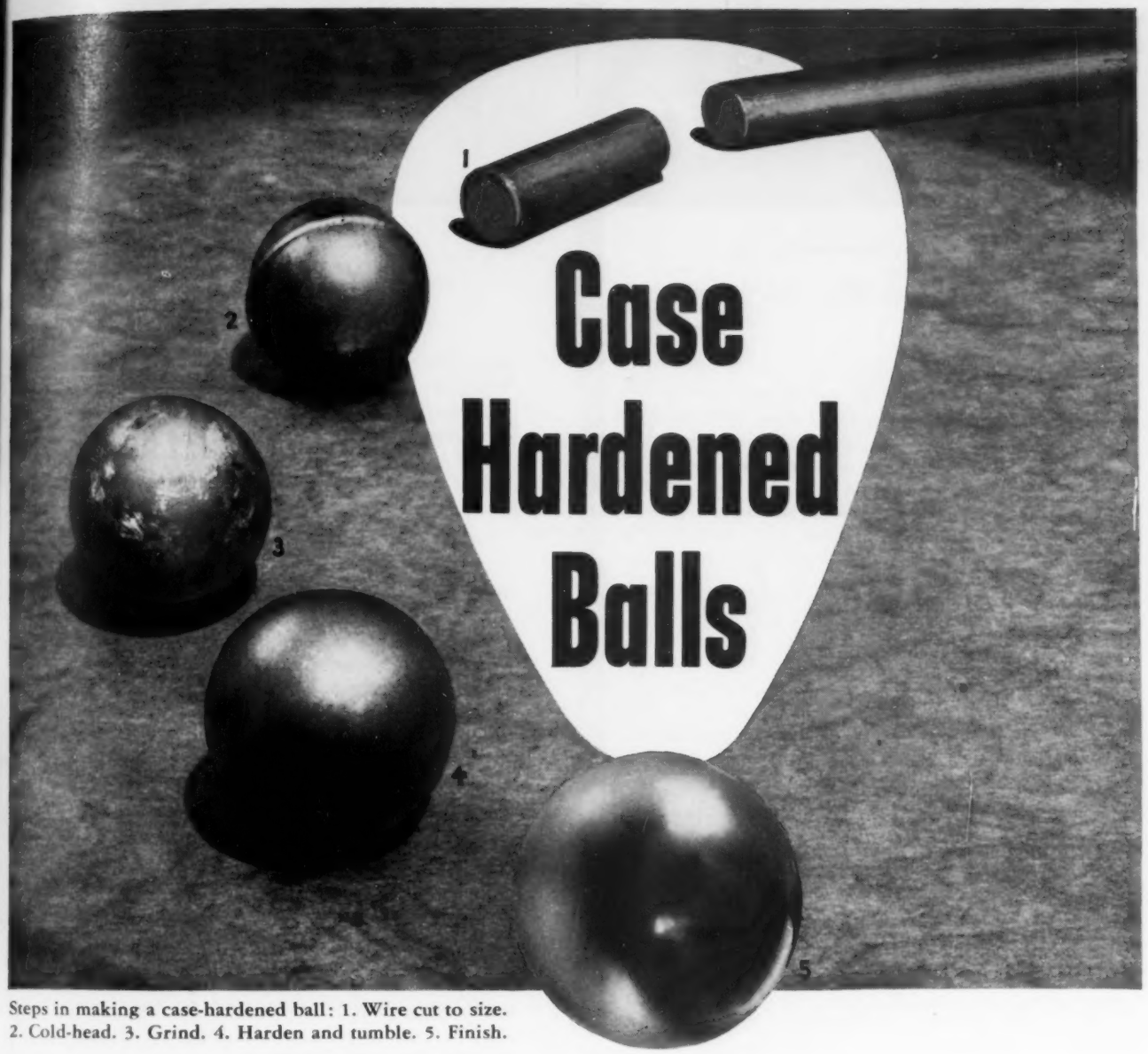

Steps in making a case-hardened ball: 1. Wire cut to size. 2. Cold-head. 3. Grind. 4. Harden and tumble. 5. Finish.

a rugged test for cold-heading wire

In making case-hardened balls the steel wire is subject to some pretty severe fabricating operations: cold-heading, dry grinding, hardening, tumbling, and finishing. But if it's Bethlehem wire, it passes this test with flying colors.

Making wire for a great variety of cold-headed items is a Bethlehem specialty. In our modern wire mills the wire gets extra-special attention—from the time we melt the steel right down to the final drawing of the wire. You can count on our wire to be uniform in quality, temper and finish. These are details that we watch carefully to help you make your product better and at lowest cost.

Bethlehem makes a type of steel wire for just about every kind of application. If you manufacture a product from wire, give us a call. Phone our nearest sales office or write to us at Bethlehem, Pa.

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Bethlehem COLD-HEADING WIRE

BETHLEHEM STEEL

The Iron Age

Vol. 172, No. 27, December 31, 1953

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DIGEST of

NEWS DEVELOPMENTS

REDS' STEEL GAINS MORE THAN FREE WORLD—P. 21
While the Free World nations outproduced Russia and its satellites by nearly four to one, the Communist countries poured 14 pct more steel in '53 than '52. Free World beat its 1952 steel production total by only 10 pct. Total scores for the year were: Reds, 54 million tons; Free World, 200 million.

DETROIT SKILLED LABOR MARKET EASIER — P. 25
Speedy hiring of 300 skilled men to retool burned-out GM Hydra-Matic production shows that the once critical shortage of skilled labor is coming under control in Michigan. Shortage isn't over but firms aren't pressing as hard. Auto tooling for 1955 may tighten the situation all over.

CAPITAL GOODS SCORE MARKED GAIN IN '53 — P. 28
Value of capital goods production and servicing for 1953 is estimated at $58 billion—a $4 billion gain over 1952. Employment in these industries gained 100,000 to 8.2 million during the year. Council for Technological Advancement study shows these industries accounted for 18.5 pct of U. S. industry output.

IS LOW PRICED CAR HP RACE STARTING? — P. 34
Release of technical data on the new Ford engine plus what is known about plans of others in the same field seems to indicate that an economy-sized horsepower race is getting under way. Ford's Y-block V-8 will be 130 hp, up 20 hp. Chevy's new engine won't have less. And don't overlook Plymouth.

WON'T WIELD AX ON DEFENSE BUDGET — P. 39
Congress will not vote drastic cuts for the coming defense budget. Key point is that new figures will probably represent military price tag for the next 5 years. Plans are for stepped up emphasis on atomic artillery, other new weapons, a 137-wing Air Force. Aim for '57 is $32 billion, a $10 billion cut.

PERSONAL INCOME MANAGES TO HOLD ITS OWN—P. 47
While other important business indicators eased slightly, the rate of personal income managed to hold fairly stable. According to the President's Council of Economic Advisers it actually rose in November after rallying in October from a slight September slip. It means overall purchasing power is relatively intact.

the Week in Metalworking

ENGINEERING & PRODUCTION

HOT OIL QUENCHING TOUGHENS SHOVEL PARTS—P. 67
Tractor shovels, by repeated back and forth movement in service, subject gears and other parts to intermittent peak stress loads. To meet these conditions, the parts are quenched in 300°F oil after carburizing. Sliding parts receive a thin, hard case by dry cyaniding. Production has been increased, costs have been cut.

GRAIN SIZE DETERMINED ULTRASONICALLY — P. 72
The grain size of a metal is a good indication of its physical character. Because the test for grain size is a destructive one, it has been used only as a spot check. Ultrasonics can make it a nondestructive test. Wave length to grain size ratios show that grain size has a marked effect on transmission qualities.

PROPER TOOLING AIDS JET PART MACHINING—P. 76
Wide use of high temperature, stainless and titanium alloys for jet engine parts has raised new demands for improved tooling. More production at lower cost can be obtained from carbides by selecting the right tooling for the job at hand. Titanium is best machined with edge wear resistant grades of carbide.

COBALT 60: INSPECTION USES ARE GROWING—P. 80
Cobalt 60 radiography techniques are being used by more firms to inspect welds, castings and internal assemblies. This gamma ray source is powerful, portable and inexpensive. You can buy a complete Cobalt 60 inspection kit for less than $800 and send your competent personnel for training in its use.

NEXT WEEK—SPECIAL ANNUAL ISSUE

Next week The Iron Age presents an outstanding review and forecast for the metalworking industry—its 99th Annual Issue. A 42-page resume of 1953 business conditions and production developments together with market and processing trends to watch for in the coming year provides helpful information for every reader.

A concise statistical section includes meaningful data on the production and use of metals. The Iron Age trade association directory has been brought up to date. A handbook of nonferrous industry terms is presented for the first time. Major meetings and conventions for 1954 are listed. The latest news and markets are covered in the usual weekly manner.

MARKETS & PRICES

FASTENERS SUFFER AS INVENTORY SLUMP HITS—P. 24
Although fastener industry sales for the year are generally running from 6 to 8 pct ahead of 1952, they have been dropping since August. Reason is the inventory adjustment by dealers and jobbers. This paring is just about complete and buyers who used to be satisfied with 30-day delivery want fast shipment.

TOOL STEEL PRODUCERS GET HEAVIER ORDERS—P. 26
Slump in the last half of '53 has honed tool steel competition to razor sharpness. Shipments are off about 22 pct. But things began to pick up in fourth quarter and the industry is looking forward to a busy first half as automakers and others sharpen their own tools for tougher competition.

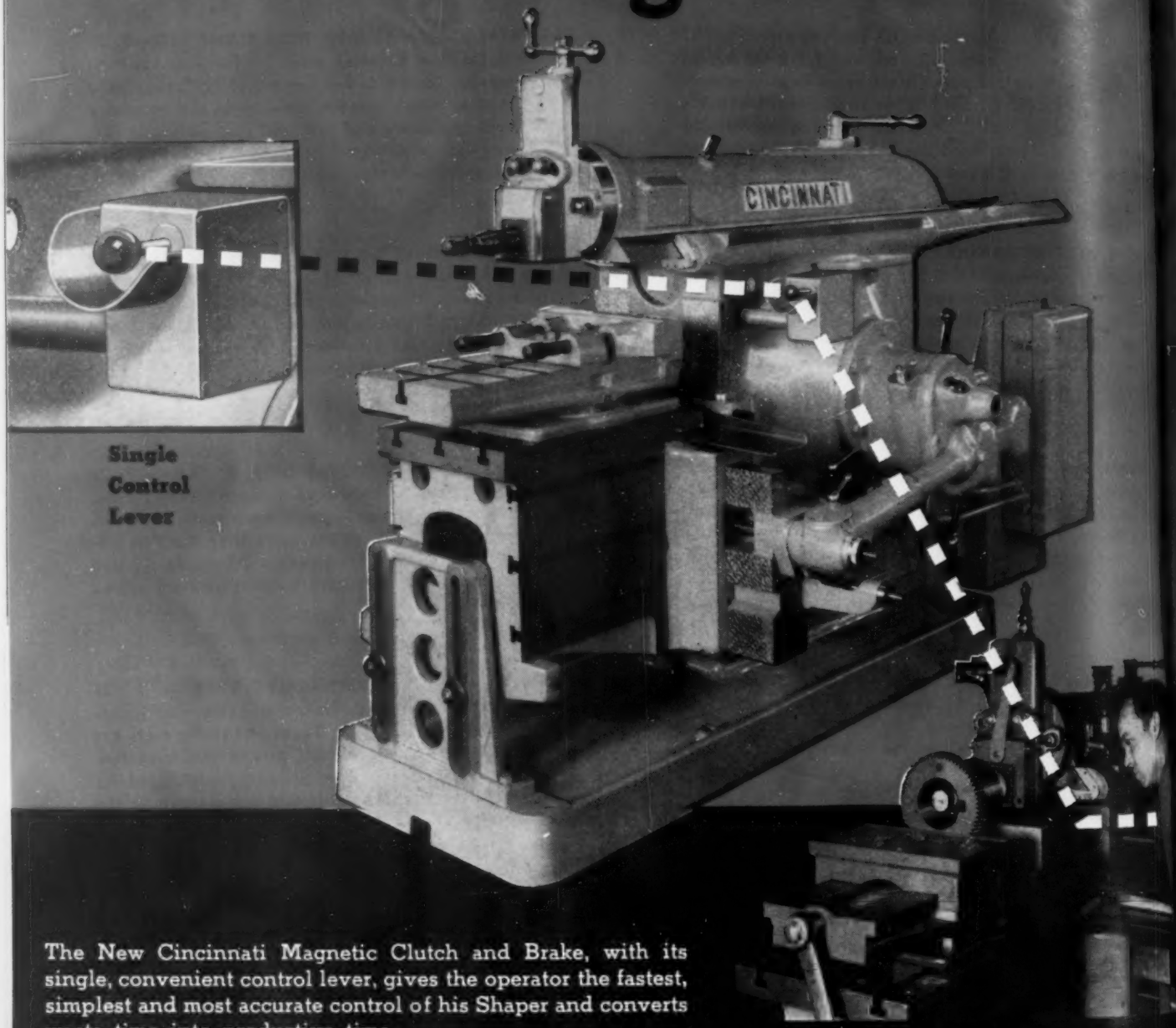
U. S. STEEL LINES UP EXTRAS WITH COSTS — P. 27
Changes in extras on hot-rolled bars, reinforcing bars, pipe skelp and galvanized sheets were made by U. S. Steel Corp. last week. At the same time the firm adjusted mill base prices for silicon steel sheets. It was expected that other producers would follow on silicon steel, maybe on extras.

STAMPERS FINISH RECORD SALES YEAR — P. 29
Despite the second half decline, metal stamping industry set new records in 1953. Taxes and rising costs are hurting stampers while expansion and modernization programs are helping. One pleasant note heard by stampers lately is the heightening competition in the steel industry.

STEEL INGOT RATE WILL REBOUND PART WAY — P. 95
Steelmaking operations this week will register only a moderate gain from the week of Christmas. Thus, the industry has put back to back the two lowest weeks in recent years. But steel people aren't alarmed. Operations are expected to gain in January and to continue to improve in February and March.

WANT SPEEDY STOCKPILING ON SOME METALS—P. 100
Office of Defense Mobilization last week revised its stockpiling policy to get rapid action on metals that are still short of quantity goals. It could serve as a market prop for currently sagging metals. Copper, zinc and aluminum may feel it. But zinc buying is limited and aluminum grade's a question.

Outstanding Time Saver...
...Outstanding ACCURACY



Single Control Lever

The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

30% Time Saving

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

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National Business Publications

Your Children and Business

THERE is some head shaking in business and industrial circles over what kind of children we are bringing up. Most elders believe that the kids of today aren't what they used to be. There is the story that they don't or won't work as hard as youngsters used to work. There is a wide belief that today's children will not be able to carry on the burdens of business and free enterprise as well as their predecessors have done.

Some of this criticism is true. But is the criticism on a solid foundation? If you base your judgment on what you did or what your father did a lot of these gripes about our youngsters are honest ones. But is it fair to take standards and conditions of 25 to 50 years ago and apply them to the kids growing up now? One way to answer this question would be to take a quick look at our youngsters of today. Here is what we will find:

¶ In a pinch they have more self confidence and ability than we had. They are faced with far more impacts and decisions than we ever faced. And they meet them head on.

¶ On the news they are so far ahead of some of our top level people (fathers) that it is embarrassing. Nor do they fall for the claptrap and the "smooth" line. They tramp on it and are left unaffected.

¶ When it comes to sizing up their teachers and their elders they do often show lack of respect. But should they have respect in those cases where they are not given a fair shake. They know better than anyone else whether their teachers are griping or teaching; and whether their parents are laying it on the line or covering up.

¶ Many of today's kids are hard as nails. Why shouldn't they be? They hear on the radio and read in the press that we will have no more than 15 minutes notice of a hydrogen bomb attack. When they read or hear that our own defense people underrate the Russians; when they see that their elders don't take these facts seriously why should they worry too much about what is likely to occur?

If you as a businessman want to know what is happening in the schools ask your children. You will get a clear-cut answer. If you want to know what values life should have in the face of the hydrogen bomb ask your kids. They can tell you.

If you have forgotten how to communicate with children then listen to their conversation. Your business and your country will be in good hands—just as good as 15, 25 or 50 years ago when you took over.

Tom Campbell

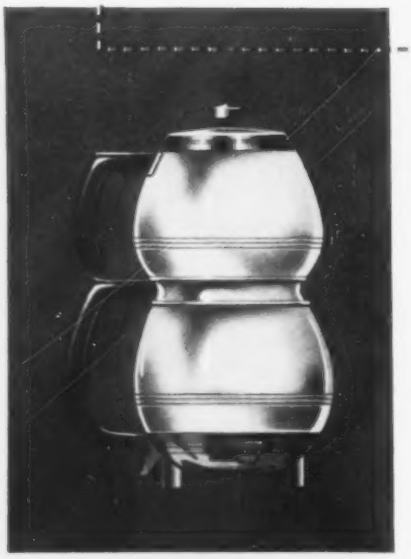
Editor

for products that must have

Eye appeal...

HERE'S THE STAINLESS WITH THE FINISH . . .

SHARON STAINLESS STEELS



A special patented steel finishing process, developed by Sharon metallurgists gives to Sharon Stainless Steels a "buffability" unmatched in the industry. Those who have compared stainless finishes after buffing know, that when it comes to finish, Sharon Stainless has no equal.

So, if you're thinking of product improvement and considering the use of Stainless Steels why not get the finest . . . . specify Sharon Stainless Steels. Technical information and fabrication help upon request.

There are Sharon offices located in Chicago, Cincinnati, Cleveland, Dayton, Detroit, Indianapolis, Milwaukee, New York, Philadelphia, Rochester, Los Angeles, San Francisco, Montreal and Toronto to better serve your needs.

Get the 430 Story

Sharon has prepared a fact-packed, fully illustrated booklet with up-to-the-minute information about 430 Stainless Steel. To get your free copy contact your nearest Sharon representative or write direct to **Sharon Steel Corporation – Sharon, Pa.**

SHARONSTEEL

Dear Editor:

Letters from readers

Titanium Locknuts

Sir:

In the Dec. 10 issue, on the Newsfront page, the following paragraph appears: "Titanium locknuts developed originally for aircraft applications, will soon be available commercially. They meet tensile requirements for steel locknuts. Design changes and use of titanium helped cut weight in half."

We would be most interested to find out the source of this information; as to what company is manufacturing these locknuts.

Titanium fasteners are of paramount interest in the aircraft industry to replace the many hundreds of pounds of steel fasteners that are now being used.

J. A. VAN HAMERSVELD
Supervisor
Producibility Engineering
Northrop Aircraft, Inc.
Hawthorne, Calif.

Further information about the titanium locknuts may be obtained by writing to the Elastic Stop Nut Corp. of America, 2330 Vauxhall Road, Union, N. J.—Ed.

Oxyacetylene Brazing of Moly

Sir:

In your Nov. 26 issue, on the Newsfront page, there is a reference to oxyacetylene brazing of molybdenum. Will you please inform me from whom I can obtain further information concerning this process?

S. J. WHALEN
Welding Sub-Section
General Electric Co.
Evendale, Ohio

This item was based on Battelle Memorial Institute's "Production of Sound Ductile Joints in Molybdenum: Progress Report," by M. I. Jacobson, D. C. Martin and C. B. Voldrich; July 17, 1953, 26 pp (NP-4718). It should be available as a "Nuclear Science Abstract" at the University of Cincinnati.—Ed.

Newsfront Correction

Sir:

We wish to point out a "two-in-one" error on p. 108 of your Nov. 12 Newsfront dealing with oxygen steelmaking.

First, the steel firm is Dominion Foundry Co. Ltd. and second, the oxygen plant is being installed by Canadian Liquid Air Co. Ltd.

ROBERT LEE
Development & Engr. Dept.
Canadian Liquid Air Co.
Montreal, Canada

We wish to apologize for the typographical errors and thank you for bringing them to our attention.—Ed.

Non-Skid Floor Paint

Sir:

I have noted with interest an article in your Dec. 3 issue, p. 146, on non-skid floor paint. I would appreciate your sending me the address of the Colonial Refining & Chemical Co. which manufactures this product.

J. W. SHOOP
Factory Manager
Elgin Sweeper Co.
Elgin, Ill.

We are glad to tell you that the address of the Colonial Refining & Chemical Co. is: NBC Building, Cleveland 14, Ohio.—Ed.

Cold Extrusion

Sir:

We would very much appreciate receiving tear sheets of the article entitled "Five-Step Cold Extrusion Line Forms 60mm Mortar Shells" which appeared in your Nov. 19 issue.

R. JOHN HESS
Vice President
Lake Erie Engineering Corp.
Buffalo, N. Y.

Learning Curves

Sir:

In your issue of Nov. 26, you have an article entitled "Practical Learning Curves Improve Shop Performance." We would appreciate it greatly if you would send us five copies of this article for our staff.

A. SANKOFF
Works Manager
Engineering Div.
Canadian Vickers, Ltd.
Montreal, Canada

High-Efficiency Filter

Sir:

On p. 73 of the Dec. 10 issue of THE IRON AGE, you refer to a new high-efficiency air filter that will resist 500°F or higher. We are very interested in this filter as it appears to have possible uses in our process. Unfortunately, we have been unable to find any further reference to it in this issue. Accordingly, we will be very pleased if you will tell us to whom we should write for further information.

FRANK EKMAN
Development & Engr. Dept.
National Lead Co.
South Amboy, N. J.

This item was based on an Arthur D. Little, Inc. Summary Report: "Development of a High Temperature-High Efficiency Air Filter," issued Aug. 18, 1953, 48 pp (NYO-4527). For preceding report see (NYO-1575). It should be available as a "Nuclear Science Abstract" at the Princeton University Library, Princeton, N. J.—Ed.

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WITH HOSE, TOO

It pays to order from your Goodyear Distributor

STANDARD HOSE REPLACES SPECIAL CONSTRUCTION

This company had been using specially-built, heavy, plied-up type hose requiring special construction at a high price. The Goodyear Distributor called in the G.T.M.—Goodyear Technical Man—found standard ORTAC hose with oil-resistant cover could do the job at a fraction of the cost.

PREMATURE HOSE FAILURE ENDED

A sand and gravel company was troubled with premature failure of water and sand discharge hose, caused by slight suction set up when pumps were started. The Goodyear Distributor and the G.T.M. recommended DIVERSIPIPE—which has served over two years and is still going strong.

Here's why it pays to order from your local Goodyear industrial rubber products distributor.

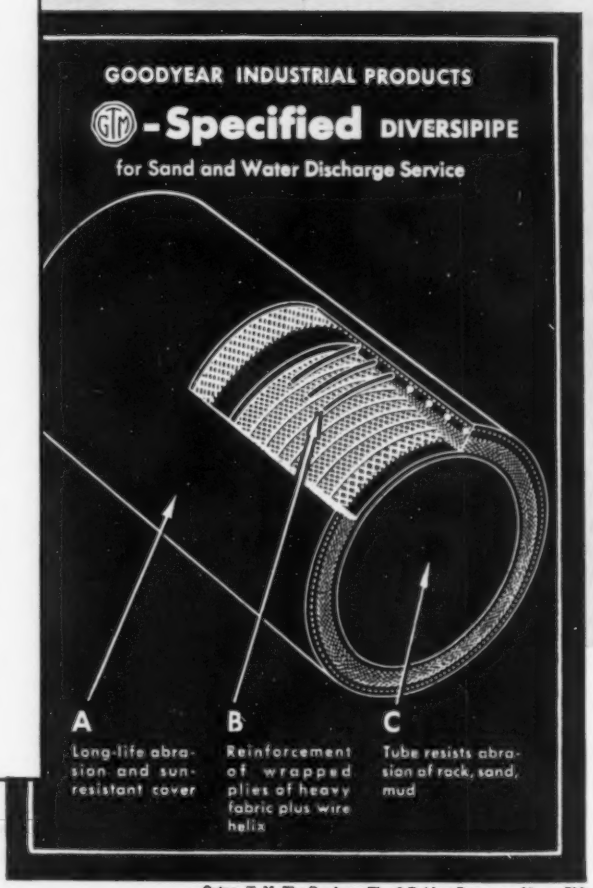
Replacement orders filled when you need them from convenient, local stocks.

One order, *one* bill, *one* central responsibility for all your Industrial Products requirements.

You save on valuable stockroom space, because your local distributor maintains a full stock of the items he knows you need.

Double assurance of satisfaction because the distributor and Goodyear stand behind the products he sells you.

Goodyear, Industrial Products Div.,
Akron 16, Ohio


GOODYEAR INDUSTRIAL PRODUCTS
GTM-Specified DIVERSIPIPE
for Sand and Water Discharge Service
A
Long-life abrasion and sun-resistant cover
B
Reinforcement of wrapped plies of heavy fabric plus wire helix
C
Tube resists abrasion of rock, sand, mud

We think you'll like
THE GOODYEAR TELEVISION PLAYHOUSE
every other Sunday—NBC TV Network

Ortac—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

Fatigue Cracks

by William M. Coffey

More History . . .

Last week we printed here some excerpts from the testimony resulting from the Sherman Anti-Trust investigation of the Steel Corporation which appeared in the June 8, 1911 issue of your ffj. We found it quite interesting—and judging from the response so did a lot of our readers who requested more. So here goes. This is still Mr. Beall of the Stanley Committee questioning Mr. John W. Gates of the Corporation:

Mr. Gates: I would like to tell you a story. Along about 1887 or 1888 a man by the name of Harry Smith was the purchasing agent of the Missouri, Kansas and Texas Railroad. The price of rails at that time, if I forget not, was about $35 a ton. Mr. Carnegie's concern at that time was a member of a rail pool, and the penalty for cutting the price was enormous. I think it was $20 or $25 a ton. Mr. Smith happened to meet a friend of mine, a hardware merchant, at Sedalia, Mo., the agent of another company, and concluded he would buy his rails of him.

Ooops . . . nearly forgot

HAVE
A VERY HAPPY
NEW YEAR!

. . . write when you get work.

He went to New York and happened to meet Andy Carnegie, whom he had known many years before, and Andrew cut the price very materially. Charges were preferred against the Carnegie Company. We questioned Mr. Carnegie and he denied everything in a general way. I knew the way he had cut the price. He had cut it by throwing in the track bolts, spikes and angle bars, which amounted to about 15 pct or a cut of $5 a ton. I finally made an open charge, or Mr. Sterling, the vice-president of our company made it. He admitted all of the charges, but refused to pay any fine.

Mr. Beall: The real cause of complaint against Mr. Carnegie was that he would not abide by the agreement, but would insist on cutting the price?

Mr. Gates: He was like a bull in a china shop. He would get things into his head once in a while and go and do absurd things that I really think he did not think much about . . .

Note: Mr. Gates seems to be pretty rough on Mr. Carnegie. We're strictly neutral—and, as we said before, this is actual recorded testimony for one day's session. We're looking in other issues for further testimony to try to even things up for Mr. Carnegie.

Puzzlers

The smallest number of fish that the five Eskimos caught is 3121 (Dec. 3 Puzzler). The winners: George L. Kalb, Mark Perucich, J. J. Farkas, Raymond Robinson, Gustaf Alsterlund, Stanley A. Orr and Mr. Rice.

New Puzzler

Many and many a year ago a good king faced the problem of inheritance. From his three sons he wished to choose the wisest to succeed him. The sons had shown themselves equivalent in the mastery of geometry, astronomy, mathematics, philosophy and camp cookery. In fact none of the available tests showed any difference among them. The king therefore commanded the president of the Royal College to devise a better test to find the smartest son.

The day of the test came. The sons were led to their father's office. "Here are five roses," he said, and showed them three red roses and two white ones lying on his desk "You will be blindfolded, and on top of each of your caps will be placed a rose. Then you will be led into the courtyard and when I tell you, you will remove the blindfolds and look at your brothers. The first man who knows the color of his own rose will become king."

The three roses were attached—a red on each cap—out of sight of the wearers. When the blindfolds were removed, the sons thought quietly for some time until at last one of them said, "Aha! I have a red rose!" How did he know?

a significant advance

FOOTE
RIMEX
for producing
RIMMED STEEL

This industry-proved steel additive reduces the cost of producing rimmed steel, with these advantages:

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RIMEX*

1. *Improves rimming action*
2. *Minimizes ingot growth*
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Costs less to use!

As THE industry's *highest* quality maintenance material, Permanente 84 keeps steel furnace bottoms in good operating condition with *less material* than usually required.

Thus, it actually *costs less* to use Permanente 84 than materials with a lower initial cost.

Leading steel producers report that Permanente 84, by lasting longer, helps cut down-time for maintenance and repair as much as 50%!

This means Permanente 84 makes possible more steel at lower cost per ton.

Order Permanente 84 now, and get that extra tonnage! It's your *best buy* for bottom, bank and tap hole maintenance. Also ideal for open hearth and electric furnace rebuilds.

For complete information contact principal sales offices: *Chemical Division,* Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California; First National Tower, Akron 8, Ohio.

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Basic Refractory Bricks and Ramming Materials • Dolomite • Magnesia • Magnesite • Alumina • Periclase

The Iron Age
FOUNDED 1855

THE IRON AGE Newsfront

INTEREST IN HIGH TOP PRESSURE OPERATION of blast furnaces is growing abroad. At least six blast furnaces in Western Europe and the British Isles are now being built as pressure furnaces or being converted for pressure operation. Savings in coke, ability to use lower cost materials, increased production rates are claimed.

INDUSTRIAL FASTENER producers believe 1st and 2nd quarter sales in 1954 will be down 10 pct from heavy volume moved during the same period this year. Jobbers' inventory adjustments, uncertainty about automotive and appliance demand are blamed.

MORE TECHNICAL ASSISTANCE AT LESS COST to United States will be aim of the Foreign Operations Administration. Budget is tentatively set at less than the $111 million 1953 appropriation. Goal: to get the 34 nations being aided to assume more of the cost.

STRONG ADVANTAGE IN STEEL PRODUCTION, almost 4 to 1, was maintained by the Free World over Russia and her satellites last year. Free World production hit 200 million net tons against 54 million tons in Communist countries.

ALUMINUM AND SOME OF ITS ALLOYS show very good corrosion resistance to fuming nitric acid, recent research shows. The report evaluates corrosion resistance of titanium base alloys, stainless steels and several commercial alloys.

QUALITY OF BRAZED AND SOLDERED PARTS has been improved and production increased through use of vacuum tube induction heaters. In one successful application involving five joints in thermostatic diaphragm, costs were cut, rejects substantially reduced.

STEEL DEMAND IN 1954 may support production in the neighborhood of 100 million tons. This (third best in history) would be a decline of about 10.7 pct from 1953 record production of 112 million tons. But consumption won't be off that much because consumers will not be building inventory as in first half 1953.

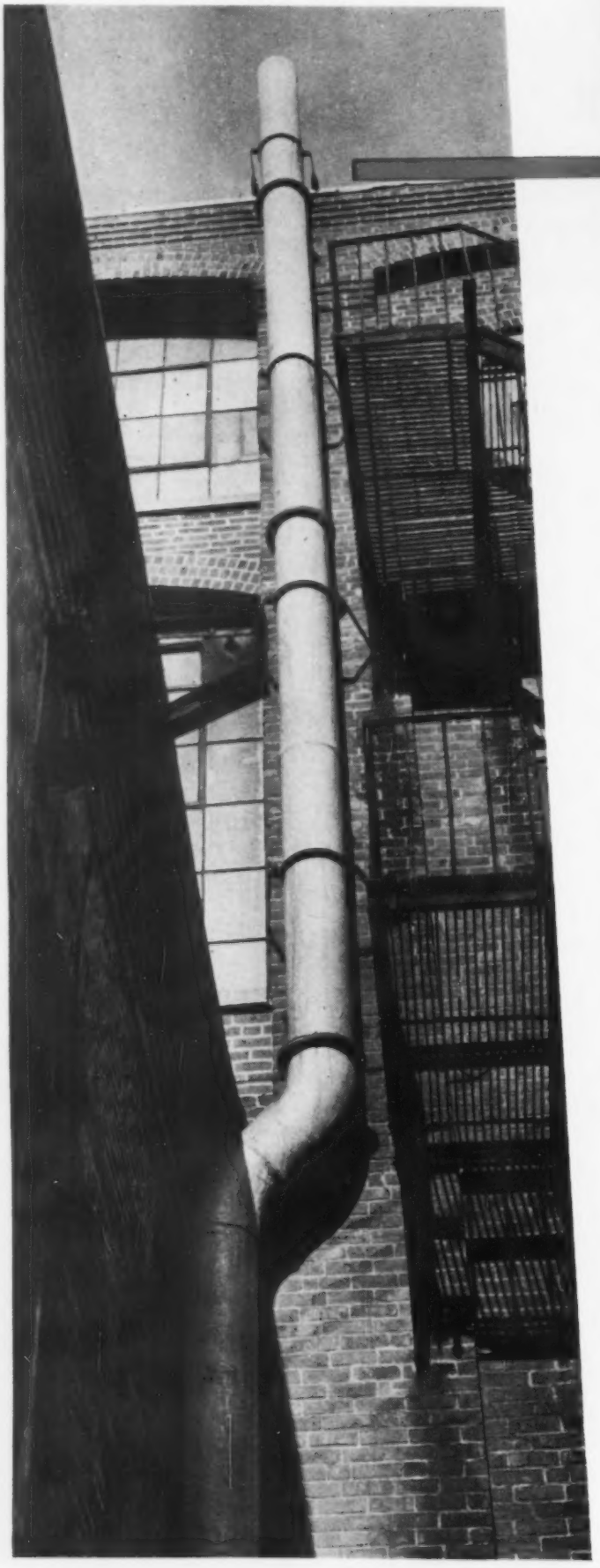
TREND TOWARD BASIC LINED CUPOLAS in foundry melting continues to grow. Lower sulfur content in resulting metal makes for sounder castings. Better ductility at high carbon contents gives strength. Low sulfur hot metal for bessemer and openhearth processing can also be made in this manner.

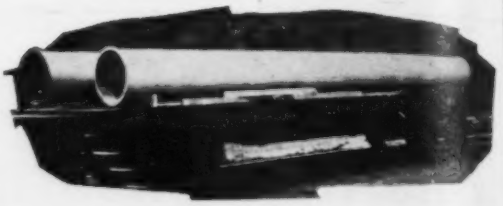
BETTER COMMUNITY RELATIONS and a better place to work have trailed the successful conquest of dust and fumes by a steel company operating electric furnaces on the West Coast. Electrostatic precipitators take out up to 20,000 lb of dust per day.

STEEL TO 3 IN. IN THICKNESS can be examined in very minute detail with a recently developed ultra fine grain industrial x-ray film when used with high voltage or betatron equipment. The film can also be used at low voltages for examining aluminum and magnesium.

HUMAN BODY REACTIONS TO CONSTANT VIBRATION will be studied by the Navy with a new vibration machine. The machine can move a man up and down 50 times a second. Aim is to set vibration tolerances to aid designers of new equipment.

"Pla-Tank" Products are manufactured by
The Chemical Corporation, Springfield 9, Mass.





STACKS, DUCTS, HOODS AND PIPES

of reinforced plastic combine strength, light weight, and chemical resistance

Reinforced plastics produced from glass fibers bonded with BAKELITE Polyester Resins form the 40-foot long fume duct shown on the flatcar above and the 77-foot fume vent stack illustrated at the left.

Reinforced plastic structures combine high mechanical strength with light weight. They are easily handled and quickly assembled, usually without special rigging. They often eliminate heavy reinforcing of the base when mounted on roof framing. They won't rust, and their resistance to weathering and chemical attack reduces maintenance costs.

Other structures, such as pipes, ducts, hoods, and tanks are also produced from reinforced plastics made with BAKELITE Polyester Resins. According to the manufacturer, the pipe can carry corrosive liquids under moderate pressures. Pipe sections can be joined right in the field by "paint brush" welding—wrapping resin-soaked glass fiber mats around joints and curing them. Ducts and hoods have a one-piece molded construction that prevents leaks. Tanks are made in a great variety of standard and custom sizes for electroplating purposes.

To learn more about these large-scale reinforced plastic structures, and about the BAKELITE Polyester Resins that make them possible, write Dept. SY-44.

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STEEL: Reds Gain Faster Than Free World

Yet Free World countries produce nearly four times as much steel as Russia and its satellites . . . In '53, Reds made 14 pct more steel than '52, Free World 10 pct—*By W. V. Packard.*

Steel production is gaining faster behind the Iron Curtain than it is in the countries of the Free World. But tonnage output of the Free World is still nearly four times as great as total production behind the Iron Curtain.

Combined production of Russia and its satellites was 14 pct greater in 1953 than in 1952. Output in Free World countries was only 10 pct higher in 1953 than the previous year.

But comparison on a tonnage basis shows a different picture. Free World nations produced over 200 million net tons of raw steel in 1953, while total production of the Communist bloc was a little over 54 million tons. This is almost a 4 to 1 advantage for the Free World.

Let's express it in tons: In 1952 Free World countries produced 182 million net tons, while the Red bloc turned out a total of 48 million tons.

Steel production in the entire world was 11 pct greater in 1953 than in 1952. Total world output in 1953 was 254.6 million net tons, compared with 229.4 million net tons in 1952.

Well over half of Free World production in 1953 was accounted for by the United States which made 111.9 million net tons. This was a gain of 18.7 million tons, or 20.1 pct, over 1952 production of 93.2 million tons. Output in 1952 was restricted by a 54-day strike which closed down most of the industry. Operations in 1953 were unhampered by labor or other troubles.

U. S. steel production in 1953 was more than twice as great as that of the entire Soviet bloc which made 54.3 million tons.

And U. S. output scored a 20 pct gain in 1953, compared with an increase of 16 pct by Russia. Despite

About This Article

This article is drawn from a world steel production study just completed by THE IRON AGE. Assisting in the study were the Intelligence Dept. of the British Iron & Steel Federation, Chambre Syndicate de la Siderurgie Francaise, American Iron & Steel Institute, the United Nations, and IRON AGE correspondents around the world.

WORLD STEEL PRODUCTION GAINS 11 PCT IN 1953

(Ingots and Castings—000 net tons)

	1953*	1952+	Pct Change
Australia	2,230	1,835	+22
Austria	1,380	1,165	+18
Belgium	4,870	5,621	—13
Brazil	1,040	985	+ 6
Canada	4,117	3,703	+11
Czechoslovakia	4,130	3,944	+ 5
France	11,030	11,979	— 8
Germany—West	17,080	17,423	— 2
—East	2,300	2,087	+10
Hungary	1,630	1,539	+ 6
India	1,620	1,768	— 8
Italy	3,800	3,897	— 2
Japan	7,600	7,703	— 1
Luxembourg	2,950	3,309	—11
Mexico	620	561	+11
Netherlands	930	755	+23
Poland	3,660	3,509	+ 4
Romania	770	769	0
Saar	2,970	3,112	— 5
S. Africa	1,500	1,326	+13
Spain	980	1,000	— 2
Sweden	1,890	1,836	+ 3
United Kingdom	19,700	18,388**	+ 7
Russia	41,900	36,029	+16
United States	111,855	93,168	+20
Yugoslavia	560	488	+15
Others	1,520	1,524	0
TOTAL	254,632	229,423	+11

* Estimated + Revised ** 53 Weeks

AISI Adopts Steel Ingot Production Index

American Iron and Steel Institute has adopted a steel ingot production index based on 1947 to 1949 inclusive. This is the same base period used in several recently revised government indices.

Starting Dec. 28, the new index will be shown in conjunction with the release of the weekly operating rate. THE IRON AGE will carry the new production index along with its weekly presentation of ingot rates in the markets section.

The index will provide ready comparison of steel production, and it will be comparable with previous years—regardless of changes in capacity.

The operating rate is useful for showing percentage of utilization of steelmaking capacity computed once a year. But it doesn't show, for example, that because of the growth of steel capacity as much steel could have been made at 89.5 pct of capacity in 1953 as at 100 pct back in 1951.

Index of Steel Ingot Production

(1947 to 1949=100)

		By Type of Furnace			By AISI Geographic Districts					
Year	Ind. Total Production	Open-Hearth	Bessemer	Electric	Eastern	Pgh.-Young.	Cleve.-Detroit	Chicago	Southern	Western
1943	106.0*	104.2*	135.9	109.0*	110.3*	111.2*	102.2*	106.8*	94.6	63.8
1944	106.9*	106.5*	121.7	100.7	108.6	110.7	102.2	107.6*	100.5*	82.9*
1945	95.1	95.3	104.0	82.1	96.4	95.4	93.3	99.1	90.4	78.2
1946	79.4	80.4	80.4	60.9	78.7	79.8	83.0	82.2	74.8	66.8
1947	101.3	101.8	102.2	90.0	100.0	103.2	98.9	101.6	97.1	97.7*
1948	105.7	105.1	102.5	120.1*	105.5	106.5	104.2*	104.9	106.3	106.4*
1949	93.0	93.1	95.3	89.9	94.5	90.3	96.9	93.5	96.6	95.9
Average	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1950	115.5*	114.3*	109.5	143.5*	115.3*	112.5*	128.3*	113.8*	119.3*	121.8*
1951	125.5*	123.4*	118.1	169.7*	126.6*	123.3*	135.4*	122.0*	122.0*	138.9*
1952	111.1	109.7	85.1	161.5	110.5	108.3	126.1	106.3	118.5	129.8
				Index of 1952—Monthly Production						
Jan.	128.3	126.4	115.8	175.1	129.9	125.6	143.8	121.6	134.6	140.1
Feb.	130.0*	128.4*	116.3	170.9	134.0*	126.3*	139.8	123.4*	133.6	151.0*
Mar.	132.1*	131.0	107.7	174.6	133.0	128.4*	145.8*	127.8*	134.1	150.1
Apr.	116.0	114.5	94.9	163.9	117.3	113.1	137.3	105.0	121.6	137.8
May	115.2	113.7	90.6	166.2	120.3	110.8	131.2	108.8	113.2	132.5
June	23.8	23.3	6.7	49.1	19.3	24.8	33.4	19.7	10.2	46.7
July	22.8	21.0	0.6	77.6	13.2	25.7	36.6	19.7	6.2	43.2
Aug.	119.4	118.5	88.0	164.9	121.0	112.9	138.8	116.8	125.0	136.1
Sept.	131.5	129.6	103.3	194.1*	130.1	129.4*	145.9*	126.2	136.6*	146.4
Oct.	137.7*	136.4*	98.7	199.2*	134.2*	135.5*	155.2*	132.2*	142.9*	157.0*
Nov.	137.0	133.4	99.0	204.0*	134.7*	132.7	152.9	135.5*	138.0	156.4
Dec.	136.1	135.2	97.6	189.6	134.0	131.9	148.1	134.7	141.2	157.0
				Index of 1953—Monthly Production						
Jan.	139.0*	137.9*	99.6	197.1	139.4*	135.1	155.1	134.7	139.3	158.3*
Feb.	138.9	137.1	103.7	205.3*	138.1	134.9	156.7*	133.2	142.2	163.4*
Mar.	142.8*	141.2*	100.9	213.3*	141.6*	136.8*	164.3*	141.2*	142.0	164.7*
Apr.	138.5	136.9	98.3	207.3	143.8*	126.0	161.9	142.3*	141.6	156.7
May	140.4	139.2	100.8	200.7	144.8*	128.7	166.8*	141.8	141.6	162.2
June	136.5	135.3	97.6	196.0	144.5*	125.0	159.2	135.8	138.7	157.6
July	130.3	129.7	92.1	177.7	137.6	119.8	148.4	127.2	142.9	153.6
Aug.	132.1	132.0	88.2	176.9	138.3	120.8	160.4	131.2	140.6	144.3
Sept.	128.9	130.2	84.5	150.2	123.9	119.7	153.6	133.2	143.6*	146.1
Oct.	132.9	134.9	92.5	136.8	145.3	120.4	154.8	130.3	145.5*	144.9
Nov.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dec.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Record Production.

Special Report

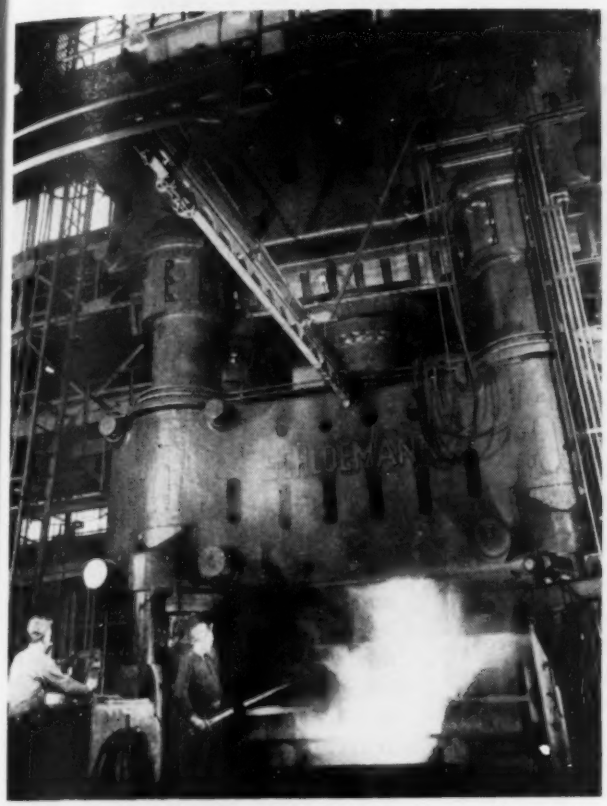
(Continued)

lengthening of the production gap between U. S. and Russia, U. S. producers fell about 13 million tons short of reestablishing the historic 3 to 1 ratio which the Russians shattered for the first time in 1952.

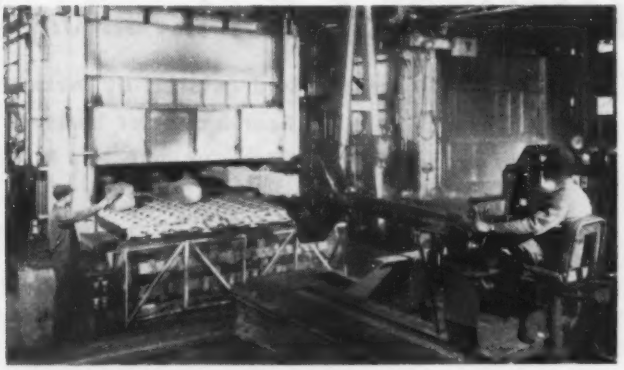
Russia dominated steel production behind the Iron Curtain more than the U. S. did output of the Free World. Russian mills accounted for 77.2 pct of steel produced behind the Iron Curtain.

Steelmaking records were a dime a dozen in 1953. World production of 254.6 million tons was a new alltime record compared with the previous record of 229.4 million tons established in 1952.

In addition, 14 of the 26 steel producing countries listed in THE IRON AGE study, established new steel ingot production records in 1953.



MASSIVE press weighs 1628 tons. Die bed measures 7½ x 21 ft.



HOT, 1300-lb, rough-shaped blank coming out of furnace.

PLACING stock on die. Smoke is from burning oil on hot die.

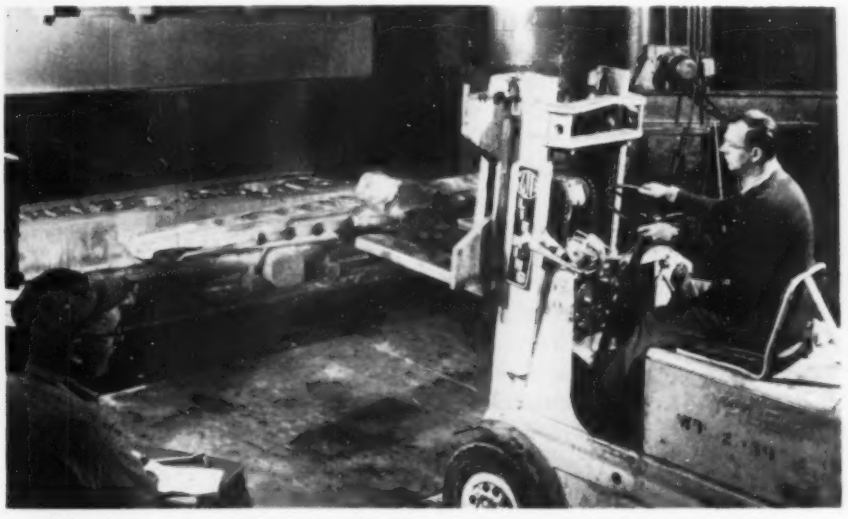
Jumbo Press Forges 1300-lb. Plane Part

Largest piece now made on the 15,000-ton forging press at Aluminum Co. of America's Cleveland plant is an airframe member for the wing structure of a Consolidated Vultee delta-wing jet fighter plane. Weighing 1300 lb, the aluminum workpiece is first hand-forged into rough shape, then preheated for final forming.

The Air Force-owned titan was built in Germany in 1940, made aluminum and magnesium forgings for the Luftwaffe until the end of the war despite many allied air raids. It is particularly suited to production of forgings made from aluminum alloys with high magnesium content and magnesium-base alloys.

WORKPIECE takes almost full die area.

SPRAYING oil on heated dies and stock.



FORGING is removed by fork truck. It's airframe part for delta-wing jet fighter.

FASTENERS: Suffer Inventory Slump

Industrial fastener field gets hit by inventory adjustment by jobbers, dealers . . . Fourth quarter business dips but '53 business ahead of '52 . . . Stress volume—By R. M. Lorz.

Jobbers and dealers handling shelf hardware have made some inventory adjustments which are being felt in the industrial fasteners industry. Although industry sales for the year are generally running from 6 to 8 pct ahead of 1952, they have been dropping since August.

The fourth quarter slump varies slightly in different areas of the country but most producers agree the decline in shipments ranges between 8 and 10 pct. Producers point out, however, that it is almost impossible to come up with a valid year-end comparison because fourth quarter '52 was unusually brisk. A year ago many firms had 12-month backlogs and most had not been able to get all the steel needed for balanced inventories.

Want Delivery—Fast

As first quarter 1954 creeps up the situation has been completely reversed. Jobbers now have their inventories neatly pared and the fasteners industry is carrying the inventory load. The steel famine is also over.

Raw materials inventories now range from 40 to 100 days, depending on individual preference. The reversal has altered buying patterns. In most cases, anticipation buying is a thing of the past. Consumers who used to be happy with 30-day terms a year ago want immediate delivery now. If the producer doesn't have a certain item in stock his competitors get the business.

Firms anxious to stay in the swim are doing everything they can to keep volume up. Volume is the life blood of this industry. To maintain it some firms are reaching out with improved service and freight equalization. Equalization has always been standard practice in the industry but it is now being watched closely from all angles.

Midwestern firms which shipped to the West Coast during the war years are now pulling out since they can no longer compete with the expanded capacity of these areas.

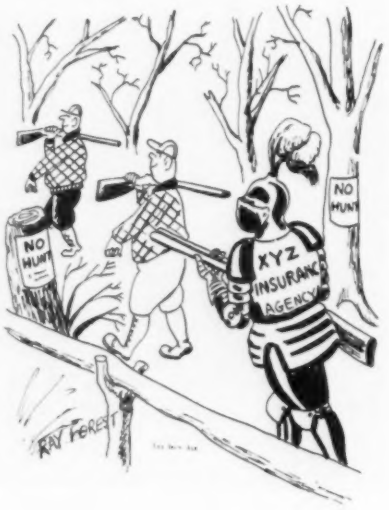
One Big Headache

Tighter market conditions, narrow profit margins and higher costs are keeping fastener people on their toes. About 4 months ago list discounts went down about 5 pct but producers say they still haven't been able to keep up with higher labor and materials costs. As competition gets more rugged price cutting also becomes a necessity.

Lumped together these problems add up to one big industry headache: How to keep volume up, prices down and profits reasonable? Other industries face the same picture but the pressure isn't as great nor is it on a day-to-day basis.

Manufacturers willing to look ahead to 1954 generally are not pessimistic. Those who lean heavily on automotive business say shipments to Detroit have picked up in December. Outlook for first quarter is good.

Demand from appliance makers is generally classified as either poor or fair. If Christmas buying is as good as some seers predict then the fasteners industry can expect to fill some shelves after the first of the year.



Jobbers not marketing strictly seasonal items will also figure prominently in sales plans for '54. If business conditions settle at a fairly high level, inventories will have to be bulked up. At the moment many jobbers are operating on a hand-to-mouth basis.

Southwestern producers remain glum about the agricultural market. Implement makers still have some finished goods stacked in inventory and the recent drought hasn't helped. Many businessmen in close touch with the farm market believe the picture will brighten if the farmers' psychology remains healthy. They believe tractors and other farm implements will start to move once the individual farmer decides not to be talked into a recession.

The "ifs" and question marks lead many top level executives in the fasteners industry to conclude that 1954 will see a general levelling off. Most firms expect business to drop off about 10 pct but the expected drop is not viewed as a calamity.

Continue Production Directives

Issuance of production directives by Business and Defense Services Administration in their present form through first half 1954 seems likely since this procedure has received endorsement of the Steel Products Advisory committee.

Toward the end of the second quarter, the committee has recommended, requirements should be reviewed in order to see if the existing production techniques are adequate or need changes.

Also, BDSA is considering whether small subcontractors should be permitted to self-authorize their orders for controlled steel mill products.

This has also been recommended by the advisory committee. It would in no way alter self-allotment authority which presently governs B products since the new proposal relates only to A items.

MICHIGAN EMPLOYMENT SECURITY COMMISSION
EMPLOYMENT SERVICE DIVISION
AFFILIATED WITH U. S. EMPLOYMENT SERVICE
FORM UCES-566-2

STATE MICHIGAN PERIOD December 9 thru 22, 1953 Page 7 of 14

Line Number	OCCUPATIONAL Code	OCCUPATIONAL Title	Number Openings	Sex	Rate of Pay	Order-Holding Office	Special Job Information
79	4-76.010	Die Maker	50	M	$2.30-2.50 hr.	Grand Rapids(407)	3462-Constructs large dies. Must be Journeyman.
80	4-76.010	Die Maker	3	M	$2.25 hr. D.O.E.	Muskegon (410)	3543-Works from B/P's & checks with prec. instr. 5 Yrs. exp. Own tools. 58 Hour week. Literate.
81	4-76.040	Tool & Die Maker	4	M	$2.43-2.69	Detroit 02 (405)	3712-Constructs, repairs, maintains

JOBS: Skilled Men Easier to Find

Michigan's shortage of skilled workers easing but not over . . . Pressure from employers not as great . . . Auto tooling for 1955 may tighten labor market again—*By R. D. Raddant.*

Early this fall when General Motors started to retool its burned-out Hydra-Matic production, an emergency call went out for 300 skilled workmen.

Through the cooperation of the Michigan Employment Security Commission, the desperately needed workers were hired in a remarkably short time. It is true that emergency measures were taken, such as speeding up visas for Canadians, but the workers were found and put to work at Hydra-Matic's new home at Willow Run.

Just recently the free employment office of MESC put on a recruiting campaign for an outstate plant that wished to add a second shift to its toolroom. There were 75 applicants the first day.

Employer Pressure Less

These are just two illustrations that the once critical shortage of skilled labor is coming under control in Michigan. There is still a shortage, as anyone who wants to hire a good patternmaker, diesinker or toolmaker can vouch for, but there are some signs of an easing situation in the supply of skilled labor.

"A skilled worker can get a job in Michigan just as fast as he could a year ago," points out Max M. Horton, director of MESC. "The difference is that he may have to work for a little less money in terms of less overtime or without a premium that he might have obtained last year. The pressure from employers is much less than it has been."

Skilled labor in Michigan is divided into two groups: Workers for the large plants such as the automotive industry, and skilled workmen in the independent tool and die shops and the like. Problems of supply and demand are similar although union agreements and conditions of employment vary.

Pay vs Security

A very general statement is that tool and die shops pay higher rates, but large automotive companies offer more job security.

There are also indications that the slight easing in the skilled labor market that is noticed at the moment may be temporary. Tool and die makers in Michigan, looking to the auto industry, expect some of their biggest automotive programs this year as the auto industry tools up for 1955.

But orders have been a little slow in materializing and tool and die shops are not at the moment going at their usual full speed. One informed source estimates that the industry is employing fewer men and working fewer hours than at any time since 1950.

Shortage in skilled workers is generally blamed on "unrealistic" apprentice programs that have not produced enough skilled labor. Ratio is usually one apprentice to eight journeymen but contracts permit exceptions. Also, unions have thrown obstacles in the way of training specialists, although industry contends they can fill shortages without extended training.

Another factor regarding apprentices is that their age makes them highly susceptible to the draft. General Motors has approximately 2600 apprentices in training and probably 1000 in service.

Some Skills Still Scarce

Most critical job categories in the Detroit area are patternmakers and diesinkers. Large manufacturing companies have other categories generally under control, but supply is not so good as they would like.

MESC publishes an inventory of job openings in Michigan that have not been filled in 2 weeks. For the period Dec. 9 to Dec. 22 the inventory lists 180 job listings of which 85 are for skilled workmen in the metalworking trades. These 85 metalworking listings actually total 582 individual jobs, as listings range from 1 opening to perhaps 50.

One Grand Rapids plant, for example, needs 50 diemakers who must be journeymen.

In counting metalworking jobs, related categories such as mill-

wrights, pipefitters, welders and electricians were not included, but only specific skilled metalworking trades.

Although this number is large, MESC officials estimate that a year ago the job inventory list was more than twice as long and that there was a much greater urgency expressed by employers.

Reasons for the reduction in demand for skilled labor can be traced to a cutback in military tooling, the model changeover completion in auto plants, and a general business cutback. Skilled workers are tending to stand pat at companies where they have "an investment in seniority" rather than jumping at an offer of 5¢ per hour more than they are getting at the moment.

Unions:

NLRB bans speeches to employees for 24 hr before voting

Both management and union representatives are now instructed by National Labor Relations Board not to make speeches to employees on company time during the 24-hour period preceding a bargaining election.

This new rule was issued by NLRB at the same time that the board reversed a 1951 ruling which demanded equal time for unions and employers in delivering talks on unionism during working hours. Effect of the 2-year-old order, the board maintains, had been to irritate and unsettle employees.

Dropping of the "equal opportunity" policy was urged last spring by U. S. Chamber of Commerce, which asked Congress to take this action in an amendment to the Taft-Hartley Act. Though this was not done, the NLRB reversal of the rule has the effect requested.

The new order affecting management and the unions, the board admits, may be interpreted as limiting the employer's freedom to speak at his own establishment in the 24 hours before an election. In the majority opinion, however, the decision is defended as "a rule of practical labor relations governing conduct of elections."

TOOL STEEL: Order Rate Picking Up

Buying slump hit tool steel producers earlier than most . . . Fourth quarter sales increase may indicate improvement for other steel mill products—By *J. B. Delaney*.

An order slump in the last half of 1953 has honed competition among tool steel producers to razor sharpness. Compared with the first 6 months, shipments are off approximately 22 pct.

But there's a silver lining in the dark cloud. As a whole, 1953 was a good year. Furthermore, orders began picking up in the last quarter and December bookings for some companies were about 25 pct higher than in October and November.

High speed steel production this year is expected to total approximately 25,000 tons, compared with about 24,000 tons last year which was affected by the 54-day strike. Record post-war year was 1951 when nearly 39,000 tons were produced.

Outlook Is Fine

Outlook for 1954 is far from discouraging, although most producers look for a decline from 1953 production. One guess is that approximately 22,000 tons of high speed steel will pour from furnaces next year.

Generally, the industry looks for a busy first half, largely on the basis of automotive tooling programs for 1955 models. One producer expects full operations through March and perhaps beyond. No one is optimistic beyond June when orders stemming from the automotive programs likely will be cleared up.

Tool Steel a Barometer

Tool steel producers generally look for sharper fluctuations in demand on a par with pre-war years. They point out that increased competition among automobile makers is resulting in more extensive model changes with corresponding changes in tools. The tool steel industry expects to find itself hitting more peaks and valleys as a result.

The same thing happened to tool steel producers in 1953 as did to the tonnage mills except that the slump hit the tool steel mills several months earlier. In that respect, the industry has come to be recognized as something of a barometer for future overall steel business. The industry is also sensitive to fluctuations in general economic conditions.

Shipments of class A high speed steel in first 6 months of the year totaled 12,106 tons, for an average monthly tonnage of 2017. Shipments from July through October, latest month for which figures are available, indicate an average for last half of the year of 1576 tons.

Speed Up Deliveries

Shipments of class B high speed steel were somewhat more stable, totaling 2868 tons through October. Shipments of other tool steels, including die steels, totaled nearly 80,000 tons through October. In 1952 and 1951, shipments of "other tool steels" totaled 99,502 and 137,958 respectively.

Producers blame the last-half 1953 decline on inventory correction by the makers of perishable tools. The toolmakers, No. 1 customer of the industry, have been largely out of the market and living off their inventories.

EXTRAS: U. S. Steel Changes Book

Firm also revises silicon steel pricing to line up with production costs . . . Extras shifted on hot-rolled bars, reinforcing bars, skelp, galvanized sheets.

Changes in extras covering hot-rolled bars, concrete reinforcing bars, pipe skelp and galvanized sheets were made by U. S. Steel Corp. last week. At the same time, mill base prices for silicon steel sheets were revised.

At presstime, other steel producers hadn't yet had time for sufficient study of the extra revisions but it's certain that they're in for close scrutiny. Other firms may well follow but varying mill setups will result in varying extras.

Adjustments Long Overdue

Changes in the reinforcing bar extras are largely a matter of standards and will probably be adopted by the industry generally. This shift will definitely make for better operations.

Indications are that other mills will follow the lead of U. S. Steel Corp. in revising mill base prices on silicon steel sheet to bring them into line with actual cost of production. Consensus in the trade is that the adjustments have been long overdue.

Detail the Changes

U. S. Steel stated the changes constitute an average increase of approximately 3 pct, although prices of certain grades have been reduced, others increased, and some remain unchanged.

The changes recognize a distinction between hot-rolled cut lengths and cold-reduced materials, and distinguish further between cold reduced coils or cut lengths in semi-processed and fully processed condition.

Changes in hot-rolled bar extras, put into effect Dec. 23, are listed:

An increase of 50¢ per ton was announced for rounds 9/16 and 19/32-in., and $1.50 per ton for 39/64 to 47/64-in. Hexagon size extras were boosted 50¢ per ton for 9/16 and 19/32-in., and $1.50 per ton in the range 5/8 to 23/32-in.

The size extra setup on near-square flats was refined to seven steps instead of five. In widths 1⅛-in. and under the extra is now 50¢ per ton compared with 35¢ formerly. Extra on widths over 1⅛-in. is unchanged.

On screw machine stock, the company will confine its MX grade to the 0.24 to 0.33 pct sulphur range, and the extra is increased from 95¢ per 100 lb to $1 per 100 lb. Extras on other free-machining grades remain unchanged.

Minor changes in processing and wrapping and boxing extras also were made.

The company eliminated the $2-per-ton extra on openhearth skelp.

Negligible extra changes were made in galvanized sheets, involving hand bundles and slight adjustment in the standard item quantity extra.

Concrete reinforcing bar extra changes involved length, quantity, and lift weight extras. There is one change in size extras to correspond with a change in merchant bar sizes. Most important change involves establishment of 60 ft as the standard length, with extras to apply on any other lengths.

The company retains the privilege of shipping 10 pct shorts—a minimum of one-half the ordered lengths on large size bars, and one-half the ordered length or 20 feet, whichever is shorter, on smaller bar sizes. The changes reflect the company's desire to standardize and thus make for better operations at mill level and provide better customer service.

New Silicon Steel Prices

(Cents per Lb)

Grade	Hot-Rolled (Cut Length)	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field		8.05	
Armature	8.15	8.40	8.90
Elect.	8.75	9.00	9.50
Motor	9.75	10.00	10.50
Dynamo	10.65	10.90	11.40
Trans. 72	11.60	11.85	12.35
Trans. 65	12.15		
Trans. 58	12.65		
Trans. 52	13.65		
Grain Oriented			
Trans. 100	13.65		
Trans. 90	14.65		
Trans. 80	16.25		
Trans. 73	16.75		

"Look here, I'm not asking you to buy because my product is better. I'm merely asking you to buy because you're my father-in-law."

—Construction—

Sewage Plant Building Increases

Upturn in the annual rate of sewage treatment plant building is reported by U. S. Public Health Service.

In the third quarter 1953, the agency says, municipalities and other population centers awarded construction contracts for 155 projects valued at $38 million. While the number and dollar value of contracts were less than in the second quarter, totals for the first 9 months of 1953 were about 20 pct higher than in 1952.

A breakdown of the projects shows 87 new plants and 68 additions, enlargements, or other improvements to existing facilities were called for by the contracting authorities. Total cost of new plants, more than half of which will serve communities with under 5000, will be $24.6 million.

CAPITAL GOODS: Marked Gain for '53

Value of capital goods production and servicing for '53 estimated at $58 billion . . . $4 billion gain over 1952 . . . Employment for these industries rose to 8.2 million.

Capital goods industries made impressive gains during 1953. Estimate of total value of production and servicing by these industries this year is around $58 billion, an increase of $4 billion over 1952. Employment involved in production, transportation, distribution and servicing of capital goods and allied industrial equipment in 1953 is believed to have been around 8.2 million compared with 8.1 million in 1952.

Keystone of the Nation

These figures are based on projection of a study by Council for Technological Advancement (CTA) of the size and structure of the U. S. capital goods industry in 1952.

CTA figures show that of the $54 billion spent in producing and servicing capital plant and equipment during 1952, machinery and other equipment accounted for $35 billion of the total. Construction was next most important at $12 billion, while servicing in the form of maintenance and repair accounted for $7 billion.

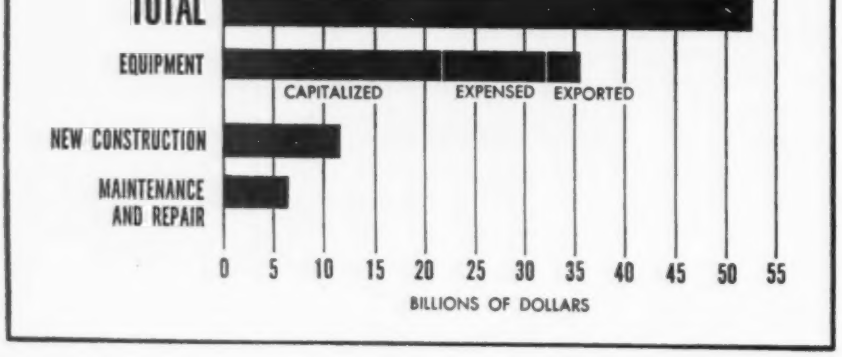
Claims that capital goods are the keystone of national welfare are emphatically supported by the fact that output by these industries accounted for 18.5 pct of total U. S. industrial production in 1952.

In addition capital goods industries employ far more workers than any other similar manufacturing group, providing 19.5 pct of private nonagricultural employment.

Of the 8.1 million workers employed by capital goods industries, 4.8 million were engaged in manufacture of equipment, 1.9 million in construction and 1.4 million in servicing. For every 1000 workers employed in producing finished productive goods about 914 were employed in supplying and supporting industries, 277 in distribution and 43 in transportation.

Another important finding pointed out in the CTA study is that no one industry in the capital goods field is dominant. Private purchases of capitalized productive equipment in 1952 totaled $22 billion and of this amount the most ($3.3 billion) was spent on passenger cars for business use. This means the largest single category accounted for only 15 pct of the total.

1952 Capital Goods Expenditures



Electrical equipment had the next greatest volume of purchases at 13 pct, followed by trucks, busses and trailers, 11.2 pct; general industrial equipment (conveyors, industrial trucks, tractors, pumps, compressors), 7.2 pct.

Purchases of metalworking machinery, including machine tools, amouted to $1.2 billion or 5.4 pct of the total; mining and oil field machinery $792 million, or 3.6 pct of the total; construction machinery, $640 million, 2.9 pct; fabricated metal products, $360 million, 1.6 pct of the overall purchase total.

What Gained Most

Preliminary estimates indicate that by the third quarter of 1953 the annual rate of expenditures on capital goods, including servicing and maintenance had increased about $4 billion from 1952, bringing the total to around $57.8 billion. This 7.5 pct increase in expenditures was about evenly divided between price increases and increases in real physical output.

Largest gains during 1953 were made in public utility and commercial construction although all other areas except construction of farm service building and industrial construction showed some increases, the CTA report states.

Employment Up 2 Pct

After adjustment for price changes and probable increases in output per manhour, CTA estimates that employment resulting from production and maintenance of capital goods had been upped by about 2 pct by the third quarter 1953.

In the production and employment figures presented by CTA only products classified as capital goods or allied industrial equipment were included. All items produced by capital goods industries for consumer use, either as consumer durable goods or as components, were left out. Had these figures been included the total would have been swelled considerably.

STAMPERS: End Record Sales Year

Despite second half dip, metal stamping industry volume set records in 1953 . . . But taxes, rising costs hurt . . . Expansion, modernization helped—*By K. W. Bennett.*

Since midyear, stamping sales have been behaving like an elevator. After confounding everybody and sailing through the first half of 1953 at record heights, levels began to slip badly in July. By December, predicting next month's sales total was like catching a square football on the bounce.

Expand, Modernize Shops

A sampling of the industry would indicate that August went up sharply. September saw a drop, though not so far as the July low point. October saw sales shoot up again to the August level. In November sales began to sink. Early December returns indicate sales are either holding their own or sinking slightly.

But preliminary statistics are already sufficient to indicate that 1953 was a record year. In 1947, the stamping and coating industries handled about 2,412,758 net tons of steel. By 1949 the figure was at 2,577,832 net tons; in 1950 it was 3,231,360 net tons. In 1951 3,887,354 net tons were processed. Said one owner of a large job stamping shop: "We've done twice the business in 1953 that we did in 1952."

Steel Supply Ample

A disheartening percentage of the increased business was being eaten up by increased taxes. Stampers, forced to nick their profit margin by climbing costs, partially solved the problem by installing new, more efficient equipment. In 1950 the stamping and coating industries made a $78,363,000 outlay for new plants. In 1951, with tools hard to get as government buying increased, they nonetheless managed to put in $57,418,000 of new plant, and bettered that figure in 1952 with a $61,263,000 capital outlay.

With his shop thus groomed for expected tough competition in 1954, the stamper heard good news last month. First of all, raw steel supply has been no great problem since late July.

Within the past month, however, he's been offered mill coil and strip in increasing quantities. Premium prices for raw materials are dead. If he can't get strip and coil locally, either carbon or silicon, in the quantities he wants, then he can get the material out-of-area at a delivered price that's competitive with the mill he can see from his own office window.

Backlogs Almost Gone

He's been offered steel on 4 to 6 weeks delivery. "We haven't been able to buy from that mill in years. Last week they called us and wondered if we needed 20 to 30 tons." Six weeks before the speaker had been buying the major portion of his tonnage out of warehouse. Most stampers found coil remaining tight somewhat longer than strip, but now find both commodities "very free."

If the stamper supplies the radio and television industries, he probably noticed a slight downturn beginning in late November. Majority of stampers, large jobbers with a broadly diversified customer list, find their backlogs pretty much wiped out. Decline since October has taken the backlog and with it, most overtime work. Capacity is reported 30 to 40 pct idle in some of these large plants. This doesn't mean "hard luck" producers. One had been running two shifts through September.

"My car has more sense than you! At least it can shift for itself."

Optimistic On '54

Faced with a downturn that was beginning in October, the stamper isn't pessimistic. Fourth quarter '53, despite the downturn, is beating fourth quarter '52. Inventory time at the turn of the year is never a bright business period for the job shops. Meantime he's been scaling down the percentage of his total output that goes into defense work since the second quarter of 1953.

Defense work is fine, but civilian customers seem to last longer, he believes.

He expects January to follow the November-December pattern. But in February and maybe as late as March, his crystal ball says something about an upturn. Probably not to 1953 levels, but to within at least 15 pct of them and maybe 10 pct.

A Few at Capacity

In the meantime, his slightly smaller neighbor may be working a 50-hour week, may have a backlog up to 30 days, and may be running behind on orders. While the majority of stampers have seen a dip since October, a few are running at capacity and will continue to do so into January. Their high rate and work still on the floor of the big job shops has held business levels at the year's end above the low point they reached in July of this year.

The average stamper is facing a buying lull. But he's either too tough to be scared, or he knows that business will have to take a long skid before he'll be back at pre-Korea levels. That is a comforting factor.

Tooled up to help industry build a

Two new bessemer converters are another example of Great Lakes Steel's readiness and ability to serve its customers in 1954.

Their job is to refine molten pig iron for the open hearth furnaces Great Lakes uses to make fine steel. This new installation doubles the capacity of the plant's bessemer facilities and contributes importantly to efficiency and quality in steel-making.

Big in themselves, these 25-foot high bessemers are only a small part of the major "tooling-up" we've been doing at Great Lakes Steel. A new blast furnace, a new slab mill, new coke ovens—all are part of a program which now assures automotive and other manufacturers of more high-quality flat-rolled steel. All together, our enlarged and balanced facilities give us an annual capacity of *four million ingot tons.* And that's good because Great Lakes Steel was set up in the first place to provide industry in its area with a *dependable first source* of sheet, strip, and other shapes used here in vast volume. We've become that source largely because of our *integration* as a steelmaker. We start right with the ore, and work it through blast furnaces, bessemers, open hearths, blooming mills, hot and cold rolling mills and merchant mills, down to the finished forms. That gives Great Lakes flexibility that lets us do a real job.

Look for more great things from Great Lakes Steel—the nation's foremost specialist in flat-rolled products. We aim to serve well our customers in many fields . . . while we keep pace with the automotive industry's mammoth needs. *Great Lakes Steel Corporation, Detroit 29, Michigan.*

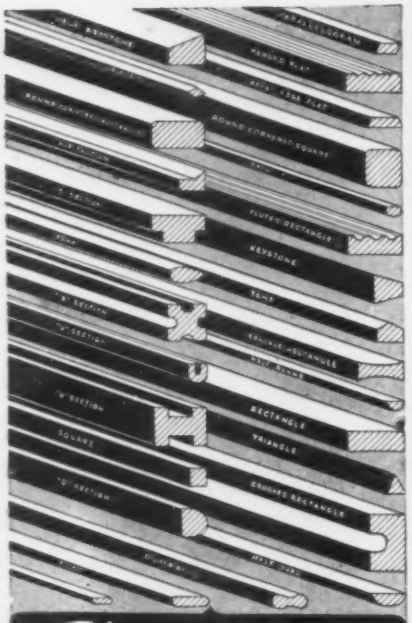
Offices also in Chicago, Cleveland, Grand Rapids, Lansing, New York, Philadelphia, St. Louis and Toledo.

Great Lakes Steel

NATIONAL STEEL CORPORATION

GREAT THINGS HAPPEN AT GREAT LAKES STEEL

Illustration: Bessemer converters, Great Lakes Steel.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Industrial Briefs

Buys Business . . . AMERICAN BRAKE SHOE CO., New York, has purchased the welding machinery business of Leader Welding & Mfg. Co., Berkeley, Calif.

Sign Lease . . . E. W. BLISS CO., Canton, Ohio, signed a 10-year lease with Industrial Assets Co. for a manufacturing plant at San Jose, Calif.

Plant Ready . . . MORSE CHAIN CO., Detroit, completed a $1,400,000 modernization and expansion program in its Ithaca, N. Y., power transmission chain manufacturing plant which will increase production at the plant.

Honored . . . THE AUTOMOBILE CLUB OF MICHIGAN honored Mervyn G. Gaskin, president of Taylor and Gaskin, Inc., in Detroit, and head of Indiana Bridge Co., Muncie, Ind., recently by electing him to its board of directors.

Any Suggestions? . . . NORTHROP AIRCRAFT, INC., Hawthorne, California, has saved a total of $1,760,000 for the defense effort as the result of more than 10,000 suggestions submitted under the company's Suggestion Award Plan since it went into effect in 1946.

New Rep. . . . ADAMAS CARBIDE CORP., Harrison, N. J., appointed C. W. Davidson Co., Indianapolis, as its sales representative for the State of Indiana.

New Moniker . . . WW ALLOYS, INC., is the new name of the wholly-owned subsidiary of Fansteel Metallurgical Corp. which was formerly known as Weiger Weed & Co.

Increased Sales . . . IMPORT STEEL CORP. reports that net sales for the fiscal year ended Oct. 31 increased approximately 27 pct over last year.

Going Up . . . THE STEEL CO. OF CANADA LTD. will start construction of a new sintering plant at its Hamilton, Ont., Works that will replace the sintering unit which has been in operation for the past 27 years.

Canadian Affiliate . . . KURT ORBAN CO., INC., New York, has formed a Canadian affiliate, Kurt Orban Canada, Ltd., at 2490 Eglington Ave., W. Toronto.

New Foundation . . . UNITED STATES STEEL FOUNDATION, INC., is a newly formed nonprofit corporation which will contribute to the support of exclusively charitable, educational and scientific activities and projects, primarily from grants received from U. S. Steel Corp. Benjamin F. Fairless is chairman of the board of trustees.

Gets Aid . . . WESTINGHOUSE ELECTRIC CORP. has engaged the services of Sanderson & Porter, a New York engineering firm, to consult with its Aviation Gas Turbine Div. on the development and production of jet engines.

2nd Safety Award . . . CATERPILLAR TRACTOR CO., Peoria, has received its second National Safety Council Award for safe operating practices this year.

They Approve . . . Shareholders of SALEM-BROSIUS, INC., Pittsburgh, voted recently to authorize a reverse stock split and cut the company's number of outstanding shares from 9,123,775 to 364,976.

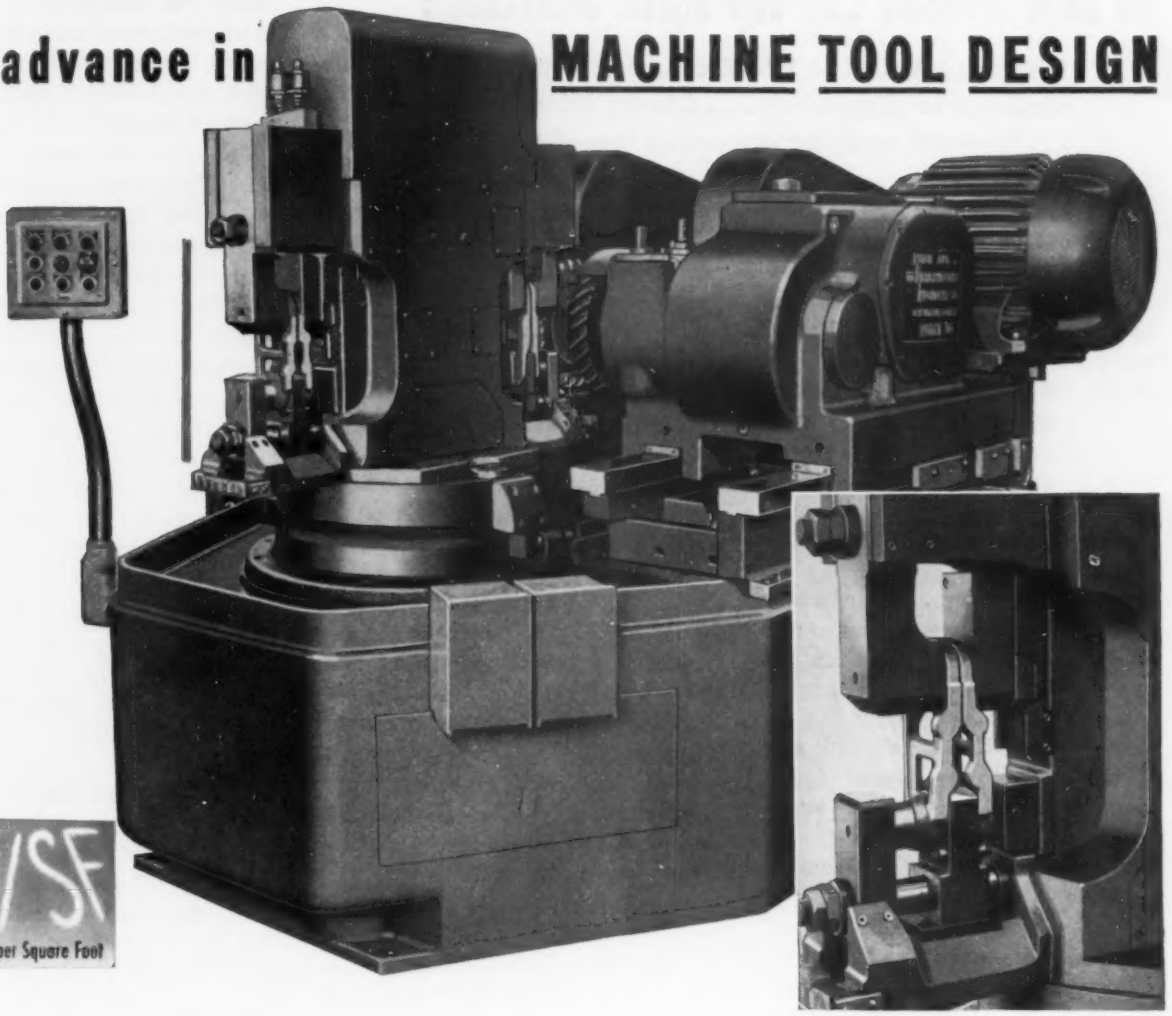
Cash & Bonds . . . AMERICAN SOCIETY FOR METALS is awarding cash and United States Bonds to High School science students all over the U. S. This is the third year the Annual Science Achievement Award Program has been presented. It is conducted by the National Science Teachers Assn. for the Future Scientists of America.

New Arm . . . KSM PRODUCTS, INC., Merchantville, N. J., has appointed S&S Industries, Inc., of Houston, Tex., as a distributor to cover Texas, Arizonia, Oklahoma, New Mexico, and the western part of Louisiana.

Major Addition . . . ROCKWELL SPRING & AXLE CO. reports that construction of a major addition to the plant of the Standard Steel Spring Div. at 6443 E. Slauson St., Los Angeles, will begin not later than Jan. 1.

Western Office . . . ARTHUR D. LITTLE, INC., Cambridge, Mass., will open a western regional office in San Francisco early in 1954. Christian J. Matthew will be in charge, with Richard Newhall of San Francisco as an associate.

Every time—count upon MOTCH & MERRYWEATHER Engineering for a clear advance in MACHINE TOOL DESIGN



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This M & M duplex production single-purpose milling machine mills two tractor side bars while two others are being loaded (removing at same station). Actually mills 70% of the time; up to 268 side bars per hour @ 100%. Two heads move, not the operator. Rigidity and power (30 h.p.) hike output. Fixtures to suit.

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PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

Is Low Priced Car Hp Race Starting?

Ford's new V-8 to be introduced at 130 hp . . . Will be sales challenge to competition . . . Chevvy bringing out V-8 in '54 . . . Plymouth readying new engine too—By *R. D. Raddant.*

Is an economy-sized horsepower race building up in the low price field?

Release of technical data on the new Ford engine this week plus what is known of the plans of others in the same field indicate it is. And market experts appear to be convinced snappy performance is as much or more of an asset in this field as the high hp engine is in the top bracket.

More Hp Coming . . . Ford's new Y-block V-8 will come into the picture at 130 hp, a boost from the 110 hp its old V-8 was turning out in its 21st year since its introduction in 1932. Offhand, this would seem to be plenty for a so-called small car, but every precedent in the auto industry points to increases in the coming years.

For example, Chevrolet stepped up its 6-cylinder engine to 125 hp this year at a time it is preparing to scrap its engine for another in '54. Does anyone believe for a minute that Chevrolet will bring out an engine at less hp than Ford? Not a chance. The Corvette already has 150 hp.

Start at Half Power . . . Then there is Plymouth to consider. This division of Chrysler is known to have a V-8 ready, and may be in the process of tooling up at the moment. With Chrysler now the current leader in the hp race, it isn't likely to let its biggest volume division suffer by comparison with the competition.

Furthermore, engines are introduced at probably somewhat over half their complete potential. It's conceivable that if the trend continues that way, the low price field could average about 160 hp by the late 50's and even approach 200 before the new Ford and embryo Chevrolet and Plymouth engines are written off.

Engines Worked Harder . . . While Ford makes no prediction of the potential of its new engine, there are some elementary factors that indicate 130 hp is only the beginning: The compression ratio is at the same 7.2 to 1 that existed in the old engine. It is designed at the moment to take regular gasoline. Engineers are still learning about combustion chamber shapes, in spite of profound statements by almost every company that it and it alone has found the secret of perfect combustion. No mention is made of any type of multiple carburetion.

Remember, Ford's old engine was introduced at about 60 hp back in 1932. However, all the increased hp didn't go for performance. Car weight gained substantially in the intervening years as did the number of drags on the engine with the addition of automatic transmissions and other hp eating devices.

Must Amortize Costs . . . Few drivers actually realize that when an auto company introduces an engine it is for so long a period. Engines are modified from time to time and often called by the company "a completely new engine," although it remains basically the same in design and principle, using the same block and other machined parts.

Because the engine has to last that long, the engine must be introduced at only part of its potential in order that improvements can be made during the many years it takes to work off tooling costs.

Ford tooling costs are still secret and probably will remain so, but it has been established that one new V-8 introduced in 1953 ran up a bill of $60 million, and this was for an output that will not approach that of Ford.

Why are costs so high? Small broaches run $40,000 and special tooling adds another $14,000. Large broaches can run over $500,000. Transfer machines can go over $600,000.

Rigidity Lengthens Life . . . Getting back to the new Ford engine, it gets its Y-block name from its deep-block construction with the block extending well below the crankshaft, giving it a Y rather than V shaped cross-section. This is intended to add rigidity and result in longer engine life.

The overhead valve engine has a 3.5 in. bore and a 3.1 in. stroke giving it an "over-square" design. The short stroke allows less piston travel and in addition reduces wear.

Built Over 16 Million . . . Cylinder heads are of a new design with a special wedge shaped combustion chamber with a large "squish area" to give greater turbulence. It has a 5-bearing precision molded crankshaft of alloy iron, which is 16 lb lighter than the former 3-bearing design.

"Ford has built more than 16 million V-8 engines since the late Henry Ford introduced the first

Automotive Production
(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Dec. 26, 1953..	74,326*	18,628*
Dec. 19, 1953..	104,621	27,472
Dec. 27, 1952..	82,844	19,714
Dec. 20, 1952..	104,638	30,295

*Estimated. Source: *Ward's Reports*

V-8 in the low price field in 1932," pointed out L. D. Crusoe, Ford Div. general manager. "I'm proud to say that these new Ford Y-block V-8's embody all the engineering and manufacturing experience we have gained over the years as the largest maker of V-8 engines in the world."

Station Wagon Surge . . . One of the most significant trends observed in recent years is the surge in station wagon production. It can't all be attributed to 1953, but it was in this year that production of these utility vehicles reached extremely significant market proportions.

Furthermore, every new 1954 model introduced to date shows new emphasis in this department and advance dope on those still coming out indicates even more emphasis in this line in at least two divisions.

About 290,000 station wagons were built in 1953, topping the 1951 record by more than 62 pct. Controls in 1952 interrupted the trend that really was launched in 1948 when this line accounted for only 2.1 pct of the market. It reached nearly 5 pct this past year.

Translating the 290,000 station wagons into comparative terms, there were more station wagons produced than total output of any one of the independents, any of the high price bracket, and some of the middle level producers.

How It Grew . . . The station wagon was originally the exclusive property of the large estate and the landed gentry. The tremendous increase in suburban living contributed to its wider use. But the biggest user today is the average, or probably somewhat over average family, in point of size and income.

The old wood-paneled station wagon is no more, and a lot of practical innovations, particularly in the less expensive 2-door type, have taken the luxury aspect out of the classification and replaced it with a practical one.

Electronics:

Auto industry boosts use in research and production.

The auto industry's interest in electronics was indicated recently in GM's $150,000 and Ford's $50,000 contributions to Wayne University's computer laboratory. (THE IRON AGE, Dec. 17, 1953, p. 78.)

But this is only one of the three fronts on which the auto industry is using electronics in research, development and production.

It has been stated before, for example, how staffs of mathematicians would work for years developing gear design tables which now can be done on an electronic computer in perhaps 200 hours. Other electronic computer uses are in analysis of sales, costs, income, production schedules, quality controls, personnel records, designs and inspection of parts.

Electronics also holds the key to automation with electronic brains running the huge transfer machines, making measurements, inspecting work done, and counting and checking. In a modern engine plant, workmen watch gages, read meters and push buttons. One never has to lift a block, slide it from one station to another, or use visual devices for checking or inspection.

Latest plants are completely dependent on electronics in their automated operations, indicating the rapid strides this comparatively new branch of physics has made in recent years. A good bet is that it is just the beginning.

New Ford Division Takes Shape

Ford's new car division, still called the Special Product Div., is rapidly taking on divisional shape under General Manager William C. Ford, youngest of the three Ford brothers.

Recent advancements are plans for the construction of a new headquarters building to be completed by the spring of 1955 on company property west of Willow Run.

THE BULL OF THE WOODS — By J. R. Williams

YE GODS! THAT WOULD BLOW IN NOW, WITH MY NERVES! SHUT TH' DOOR, ERNIE!
AT LAST, THERE'S SOMETHIN' BEIN' DONE ON THAT DESK--AN' WHAT A JOB, TRYIN' TO KEEP YOU ALIVE! WHY, WITH US IN TH' DRAFTIN' OFFICE FURNISHIN' ALL TH' BRAINS, YOU GET IN THIS SHAPE!
THAT GUY IS HARD ON ALL OF US. CUZ THEY SHUT TH' DOOR ON US JUST WHEN IT GETS GOOD!
J.R.WILLIAMS
THE FEUDERS
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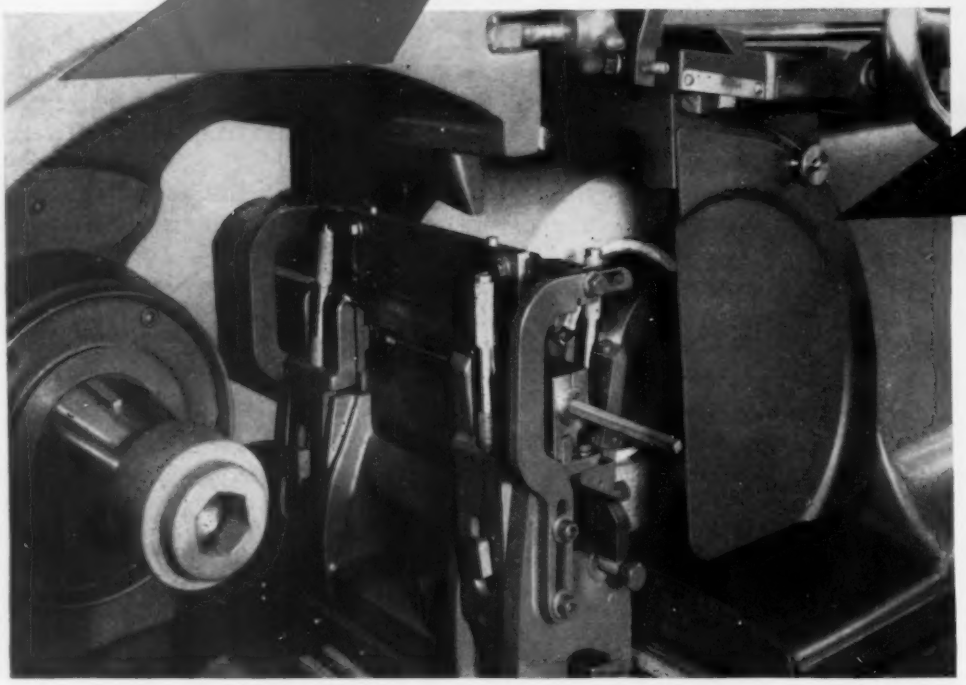
Grinding Carbon Rods

an unusual centerless job with the usual CINCINNATI ADVANTAGES



The grinding wheel has been removed to show the equipment for grinding round carbon rods from square stock, on a CINCINNATI FILMATIC No. 2 Centerless Grinder. This setup is applicable to grinding other material having the approximate consistency of carbon rods.

CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Complete specifications may be obtained by writing for catalog No. G-611.

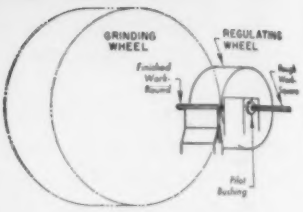


Diagram showing principle of operation, grinding round carbon rods from square stock, on a CINCINNATI FILMATIC No. 2 Centerless Grinder.

FILMATIC

Unusual applications are becoming more commonplace for the versatile CINCINNATI FILMATIC No. 2 Centerless Grinder. Now, carbon rods are rough ground from square to round in one pass, at a thrufeed rate of 20 feet per minute. Then a finish grinding operation on a No. 2 Centerless produces accurate roundness and sizing within .0005". Small diameter carbon rods, below ½", are usually ground in three or four passes. ¶Shops that discard old grinding methods and assign their work to CINCINNATI FILMATIC Centerless Grinders can count on these advantages:

a) Little or no down time, because of FILMATIC grinding wheel spindle bearings and other features of sound engineering.

b) Simple changing of wheels and work rest blades.

c) Close limits of accuracy, promoted by rugged construction and sensitive slide adjustment.

d) Simple, easy to operate.

You may not be interested in grinding carbon rods, but you can't overlook the advantages of low-cost precision grinding offered by CINCINNATI FILMATIC No. 2 Centerless Grinders. ¶Why not re-examine your cylindrical grinding operations with the idea of improving results through the centerless method of grinding. Catalog No. G-611 gives you complete details of these reliable, low-cost producers.

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CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

Will Wield No Ax On Defense Budget

Figures may hold for next 5 years . . . Plans call for emphasis on atomic artillery, other new weapons, 137-wing Air Force . . . Bill will run over $30 billion—By G. H. Baker.

New defense budget—on both appropriations and sums actually available for spending—is to sustain only moderate cuts in the months ahead. Drastic reduction will not be voted by Congress.

Key point is that budget figures for the Pentagon, which soon go to Congress, will represent the defense price tag for not only next year but perhaps the next 5 years. Actual spending can be figured at several billions higher each year as the more than $50 billion backlog of unspent funds is worked off.

Present plan calls for moderately stepped-up emphasis on atomic artillery and other new weapons and a 137-wing Air Force. Air plans call for 115 wings by next June (1 more than earlier expected), 120 by June 1955, and 127 by mid-1956. Personnel requirements to support the plan are placed at between 3.1 and 3.2 billion. Annual bill at current cost levels won't run less than $30 billion, probably a little higher.

More for Less . . . Annual defense outlays are now scheduled to be cut down to the $32 billion mark by 1957. This means a reduction of $10 billion from the peacetime high of $42 billion in the hands of the Army, Navy, and Air Force during the present fiscal year. For the spending year starting next July 1, military outlays probably will be held to the $40-billion mark.

"More defense for less money," the slogan of the new Pentagon team headed by Charles Wilson and Roger Kyes, is beginning to take hold in military procurement circles. Mr. Kyes believes the U. S. can no longer afford to prepare for every conceivable kind of war. But defense spending must remain at a relatively high point for a long time. Big aim is that the taxpayer gets his money's worth for every dollar spent on defense contracts.

Expansion Keeps Going . . . Tone of optimism prevails among government experts concerning business outlays for construction, new plants, and capital equipment. They hint cautiously that 1954 totals may run close to record figures for 1953. Outlook is based on fact that some 68 expansion goals are still incomplete, that expansion and construction programs failed to decline as much as expected during late 1953, and that surveys of business plans indicate bigger outlays through first quarter than had been anticipated.

Durable goods industries plan to spend slightly more on plant and equipment during early 1954 than last year. As for construction, there won't be much slowdown this year in publicly financed projects except in housing, military, and industrial fields.

Highway and delayed state projects will serve as prop. Population migration trend toward suburbs is encouraging more commercial construction. As yet no big dent has been made in power and pipeline backlogs. About $34 billion for construction, about $25-$26 billion for plants and equipment seems a good guess.

"The way they're cutting expenses around here you have to have a sideline to make up for the old pork barrel."

Urges Navy Buildup . . . Immediate start on a bold new shipbuilding program is being urged by the Navy Dept. Its reason: Future U. S. naval capability to move effectively in both defensive and aggressive warfare in the long and rough game that lies ahead may well be at stake.

Admiral Robert B. Carney, Chief of Naval Operations, believes that construction of new types of vessels, plus modernization of the present fleet, must be pushed without delay. U. S. shipbuilding has been taking a seventh-inning stretch in recent years. Decision must be made promptly as to whether the U. S. will resume building new ships or risk slipping into the desultory period of the 1920s' and 1930's.

Reds Stress Combat Ships . . . In the 8 years that have passed since the end of World War II, the U. S. Navy has not commissioned a single postwar model of its ship-of-the-line, the aircraft carrier. Two are now under construction, but commissioning of the first of these still is more than a year away.

Soviet shipyards today are now devoted exclusively to construction of combatant tonnage, Admiral Carney believes. He points out that the Reds are ordering more and more tankers, cargo ships, and fishing vessels from non-Communist nations. By using the shipyards of the free world for merchant construction, the Soviets are able to keep their own yards free for development and construction of combat ships. Russia today clearly is determined to emerge from her land-locked position, and to challenge U. S. supremacy.

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SHIPBUILDING: Industry Faces Glum Year

Marked slowdown on new orders for Navy . . . Mothball 600 merchant ships . . . Labor the big cost factor . . . Foreign yards becoming more competitive—By *A. K. Rannells.*

Shipbuilding and related industries have more than just passing interest in the answer to questions confronting Congress concerning future size of the Navy and the merchant marine.

Outlook for the industry isn't promising unless it gets a shot in the arm. This is the opinion of experts at the Labor Dept. who have been mulling over figures and charting trends.

Navy Construction Drops

As 1953 began, private yards were working on or had orders for 43 naval vessels totaling 300,000 displacement tons. They also had on order or under construction 63 commercial type vessels aggregating another 1 million tons.

But bloom is rapidly wearing off defense contracts which picked up soon after Korea. Big orders are well on the way to completion. There's been a marked slowdown in new orders.

In peak 1952 and well into 1953, Labor Dept. statistics show that nearly one-half of all workers engaged in shipbuilding were assigned to work on Navy contracts.

Foreigners More Competitive

That's why talk of increased emphasis by the military on air power under a somewhat reduced defense budget is of considerable concern to shipyards and their employees.

Indications now are that sometime this year the American shipbuilding industry may be back in a position similar to prewar—in a tough competitive market where higher production cost tends to throw commercial orders to foreign yards.

There isn't much chance of domestic yards reducing costs since about 75 pct of the total is chargeable to labor. Labor cost can't be reduced much except on orders for at least 5 ships of a kind. Most peacetime orders are for 1 or 2.

Picture isn't as dark as it appears at first glance, however. Navy hasn't let all its contracts under the 1953 program and these are scheduled for doling out to private yards.

Also, Naval repair activity can be counted on to continue at about present levels since the service schedules repair and overhaul of its vessels on a regular cycle.

Likewise, the Navy will continue its modernization program for both active and reserve vessels. A number of both are slated to be equipped with newer weapons, radar, and other modern electronic devices.

Merchant Fleet Smaller

Prospect for maintenance and repair contracts for commercial vessels is less promising. Some 600 ships have been withdrawn from the active merchant marine.

While most of these will require reconditioning before being placed in mothballs, repair work on the active fleet will likely decline because of its smaller size.

Best guess, barring some new action by Congress, is that shipbuilding employment is likely to skid by about 25 pct during 1954, most of it during last half. Most of the reduction will likely be in private yards since Navy has no present reduction plans.

This would bring total shipyard employment, Naval and private, to about 220,000 by next January compared with 266,000 at the beginning of 1953.

"This year we are featuring the best copies of American models."

Industrial Peace:

Company-union harmony study covers 7 years, 30 firms.

Mutual benefit for both management and labor is produced in those companies wherein the employer recognizes the value of a functioning union organization and the worker realizes his welfare is dependent on the employer's prosperity.

In part, the foregoing represents the findings of a 26-member committee which has just reported on a 7-year study of the "Causes of Industrial Peace." Backed by John Hay Whitney, New York financier, and created by the National Planning Assn., the group examined employer-employee relations in some 30 companies.

Industries represented by the firms surveyed, with plants in the U. S., Canada, and England, included steel and machine tool, aircraft, glass, textiles, and rubber.

The report maintains there is "clear-cut evidence" that employer encouragement of membership in unions is one of the factors stimulating harmony between management and labor. On the other hand, the report says, the facts seem to refute union arguments that a union shop or a closed shop is a fundamental of industrial peace.

It is recognized by the committee that its study covered a period of general prosperity and that labor relations could become less agreeable in times of recession. The group contends, however, that where compatible relations are established beforehand there is less chance of a disruption of sympathies during "hard times."

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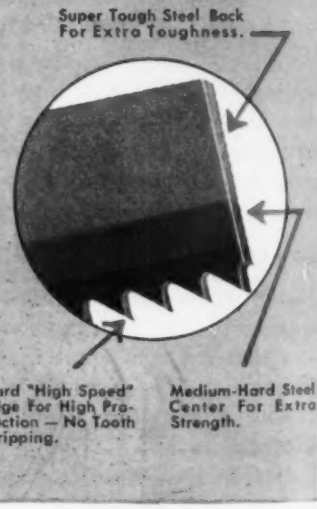
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Custom Truck Industry Passes Crest

West Coast's heavy highway truck builders winding up 10-year output race . . . See mainly replacement sales in 1954 . . . Annual gross about $25 million—By *T. M. Rohan.*

The custom-built highway trucks of the West—made to handle the heaviest highway loads in the U. S. —have finally reached the crest of the hill after a 10-year climb.

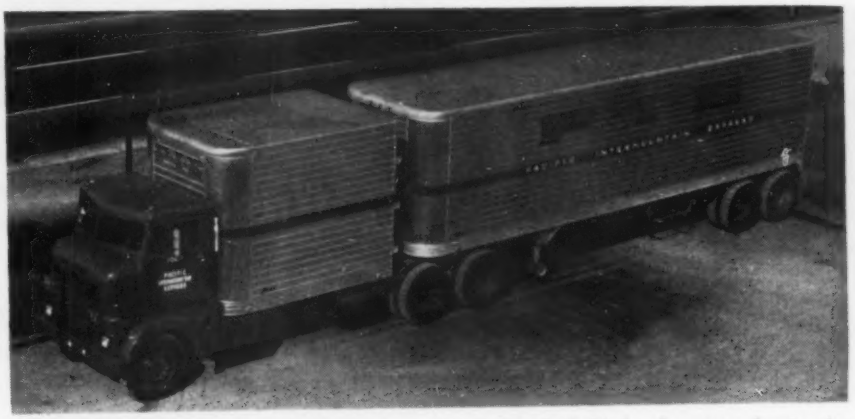
Expect Normal Year . . . Three leading producers, Peterbilt of Oakland, Calif., International Harvester of neighboring Emeryville, and Kenworth of Seattle expect 1954 to be their first normal year in 10 years. After a production race to keep up with the rapidly expanding western trucking industry, 1954 is expected to be devoted mostly to replacement of existing worn-out equipment.

Kenworth and Peterbilt between them turn out 80-90 pct of custom-built highway trucks for major operators in the 11 western states. International Harvester has largest output of the three at about 600 per month and concentrates mostly on individuals and smaller operators as well as a major business in off-highway trucks, principally logging.

Sales Outlook Good . . . Peterbilt's sales for 1953 which reflect industry trend hit $6 million or about 350 trucks from a 1952 high of 400 trucks at about $7 million. Sales in 1954 are expected to about equal 1953 which had a poor fourth quarter after a fast start.

A fourth producer, Freightliner at Portland, originally started building cab-over-engine types for use by its own truck fleet but has now branched into outside sales through White Motor Co. The four producers together represent about a $25 million annual western metal-working industry. Typical tractor units sell for about $18,000 each.

Build From Ground Up . . . In addition there is a host of western trailer manufacturers throughout the area in a highly competitive business. Major transcontinental truckers such as Pacific Intermountain Express of Oakland have up to 2500 pieces of equipment including separate tractors and trailers and fleets of delivery trucks.



"DROMEDARY" type truck with cargo compartment directly behind cab-over-engine tractor was developed jointly by Pacific Intermountain Express and Peterbilt Motors, Oakland, Calif., for higher capacity in a shorter truck.

Unlike the assembly-only western auto plants, custom-built highway trucks are made to customer order from ground up including, in many cases, the engine.

Western Use Only . . . While most states have maximum gross allowable highway loads of 40,000 to 60,000 lb, western states have gone to 76,000 except Oregon and Washington at 72,000. This has given rise to western manufacture of trucks for loads within the area.

Comparable firms in other areas concentrating on custom-built trucks are Dart Truck Co., Kansas City; Rockway, of Cortland, N. Y., and Sterling of Wauwatosa, Wis., mostly in standardized or off-highway type production.

Custom-built western truck bodies are rolled and hand-fitted rather than stamped, giving a better quality job and using slower but less expensive equipment. Resale value is estimated at $1000-$2000 over comparable mass-produced trucks.

Aluminum Pays Off . . . Aluminum is extensively used to cut weight and increase payloads. On a typical Peterbilt model, for instance, about 1500 lb is saved through heavy cross-section aluminum frame and bodies, increasing payload by the same amount. Although increasing cost by about $1500, this is usually amortized in a year by operators through heavier payloads.

Use of western extruded aluminum channels for frames was started this summer after installation of chilling facilities at a Los Angeles plant. Structural alloys up to 75,000 psi tensile strength are used. Transmissions generally come from midwest suppliers for cost reasons.

Go 1 Million Miles . . . Most trucks are built with 12 forward speeds and 3 reverse for mountainous western country with a variety of loads. Truck manufacturers use 17 types of engines, with 14 types of unit transmissions having 4 to 10 speeds and 5 types of auxiliary transmissions, equivalent to automobile underdrive and overdrive.

It is not at all uncommon for these trucks to go 1 million miles without major overhaul. Regular highway trucks turn in about 20,000 miles per month each.

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New Orders Now as Low as Pre-Korea

NMTBA's new order index slumps 50.4 points in November . . . November dollar value of new tool orders estimated at nearly $44 million, was $58.7 million in October—*E. J. Egan, Jr.*

Members of the National Machine Tool Builders Assn. are taking a long look at the latest industry statistics on new orders and shipments just released by their Cleveland headquarters. The NMTBA new order index, which had already dipped below the 200 mark to 198.7 in October, took a sharp drop of 50.4 points in November to an estimated figure of 148.3.

This is the lowest figure reported for the year, and also the lowest monthly index for the industry since the first half of 1950.

By comparison, November new order index figures for the previous 3 years looked like this: 1950—291.9; 1951—330.5; 1952—205.4.

Dollar Value Down . . . Estimated dollar value of new machine tool orders in November is $43,850,000. Actual value of new orders for October came to $58,750,000. New orders from foreign customers represent 11.0 pct of the preliminary November index, slightly more than in October when they accounted for 10.7 pct.

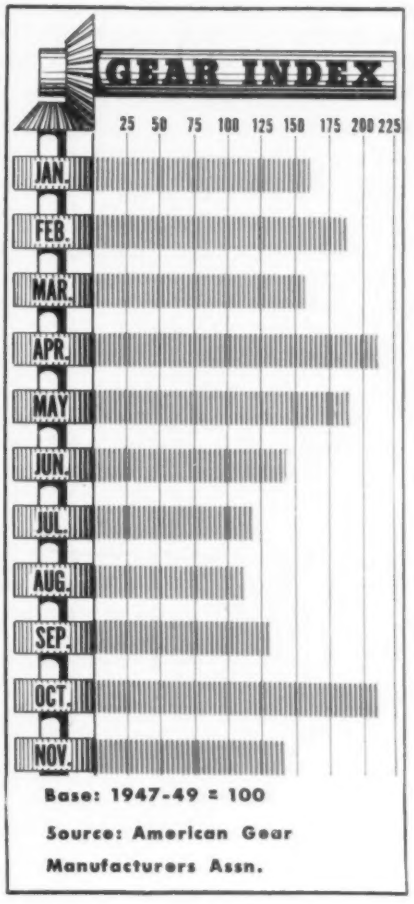
Machine tool shipments also dropped last month in comparison with the October rate. The estimated November index of shipments is 322.2, a reduction of 26.2 points from the final October figure of 348.4.

Defense Lags . . . Current shipments still reflect the completion of defense orders and contracts. But these are not being replaced with new defense business at anything like the outgoing rate.

The ratio of unfilled machine tool orders to the industry's demonstrated production rate boils down to a 6½ to 7 month backlog. At the beginning of the year the backlog was 11 months.

Gears Slip . . . The American Gear Manufacturers Assn. index of activity also showed a decrease for November, dropping to 144.9 from an October figure of 211.1. As may be seen in the graph printed on this page, the latest index figure is not the low point for the year and does not seem to point up any particular trend.

Chrysler Advantages . . . New statistical evidence indicates that better surface finishes, less wheel dressing and increased grinding wheel life are among the advantages achieved by Chrysler Corp. through installation of a central coolant supply system at its new transmission plant in Indianapolis.



So far the system has been applied to all production grinders working on steel parts—about 150 machines. Plans call for eventual extension of the system to all machine tools in the plant using soluble oil for grinding and cutting operations on cast iron, malleable iron or steel.

Daily Control Check . . . Soluble oil used in the setup is stored in a central tank farm located underground outside the main building area. From the storage tank the oil is pumped to proportioning equipment where it is mixed with city water. A daily control check is made to insure that a correctly proportioned coolant mixture is kept flowing to the machines.

A network of overhead supply lines carries the coolant to the grinding machines. Valves at each machine location regulate the flow according to requirements.

Lose Little Coolant . . . Used coolant is carried away from the machines through underground lines to a main trench which leads to a sump. From the sump, coolant is pumped to flotation equipment where contaminants are removed. The clean coolant mixture is then pumped back into the supply system.

In operation since last June, the central coolant system has already demonstrated a number of cost saving advantages. Major saving probably results from the fact that very little coolant is lost.

Maintenance of the central system is less costly in time and labor than if each production machine required frequent cleaning of sludge and replacement of coolant thus lost. Considerable floor space is also saved in plant production areas since coolant cleaning equipment is not required at each machine.

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4142 / **TS 4142** → Chrome-moly grades having high hardenability with good strength and wear resistance. Respond well to simple normalizing. Also develop excellent impact resistance when drawn in the upper ranges. Not subject to embrittlement after tempering or prolonged exposure to relatively high temperatures. Can be readily welded. In the heat treated condition these grades possess high tensile strength with good ductility, better shock and impact resistance and comparatively good machinability. Frasse stocks these grades both heat treated and annealed. Heat treated stocks are stress-relieved — this permits machining with a minimum of distortion. Annealed material machines at 66% of B1112, heat treated at 52%. Principal uses: valves, flanges, nuts, bolts, automotive parts—steering arms, axles, etc. *Stocked by Frasse in bars—annealed, and heat treated to ASTM-A-193.*

4340 → A nickel-chrome-moly grade. An air hardening steel developed to provide strength in the medium carbon range. Useful for heavier sections; good fatigue-tensile ratios provide higher margin of safety than most steels. Excellent torque properties. Water or oil hardening used with unusually large sections. Machinable at 57% of B1112. Principal uses: aircraft engine parts—crankshafts, propeller shafts, etc. *Stocked by Frasse in aircraft quality bars to specs Mil-S-5000A and AMS 6415D.*

8620 / **TS 8620** → Nickel-chrome-moly grades having good carburizing qualities. When carburized, develop uniformity of case, superior core toughness and relative freedom from distortion. Machinable at 66% of B1112. Principal uses: armature pinions, bearing races, cams, etc. *Stocked by Frasse in bars.*

8630 → A nickel-chrome-moly grade that offers excellent hardenability from heat treatment. Heat treats without distortion. Easily fabricated in the annealed condition. Possesses good welding qualities. Principal uses: aircraft parts—braces, struts, etc. *Stocked by Frasse in aircraft quality sheets to AMS 6355D.*

8740 → A nickel-chrome-moly grade with good fatigue-tensile properties, good toughness at high hardness, good depth hardness and response to heat treatment. Also possesses stability of structure at high temperature, good machinability (66% of B1112) and relative freedom from distortion. Principal uses: aircraft parts, differential gears, spindle shafts, etc *Stocked by Frasse in aircraft quality bars to specs Mil-S-6049 and AMS 6322D.*

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REPORT TO MANAGEMENT..

Income stays constant

Important business indicators may be slanting mildly downward, but personal income retains such stability as to seem oddly aloof to the adjustment in which the economy is embroiled. This resistance testifies to overall intactness of purchasing power which will not appreciably dip in 1954. In fact, income will be a strategic pillar of support for continuing prosperity in '54.

From aggressive to passive

Yet, the potential to buy is not an economic panacea unless transformed into actual buying. Buying attitude of the consumer is subtly changing, will do so more obviously after the Christmas buying splurge. His tendency to save has been accentuated and the rate of increase in his installment debt has lost much momentum. Although perfectly willing to buy next year, the consumer may have to be coaxed. Instead of an aggressive buying spirit, industry is likely to encounter a willing but more passive one.

Good times pocketbok

But whether you have to lure him to the retail counter or restrain his rush, the consumer will have the pocketbook to sustain prosperity at, or close to, this year's levels. Aside from a continuing high rate of personal income, the consumer enters 1954 with nearly $200 billion in savings, liquid assets, bonds. He will be in debt however to the tune of almost $29 billion.

How income trend went

How stable has personal income been? In November, it actually rose, according to estimates by the President's Council of Economic Advisers. On a seasonally adjusted basis, income clambered to a peak $287.5 billion in July. From there it eased to $287 billion in August and to $286.3 billion in September. Economists alertly watched for further signs of worsening. They did not come. In October, income rebounded to $287.3 billion. Whether income will continue clambering upward is doubtful. A moderate, fluctuating setback is entirely possible in months ahead. But any decline should be so minor as to be painless. Industry's main problem is not personal income but convincing the consumer to use it actively.

Trade barometer rising

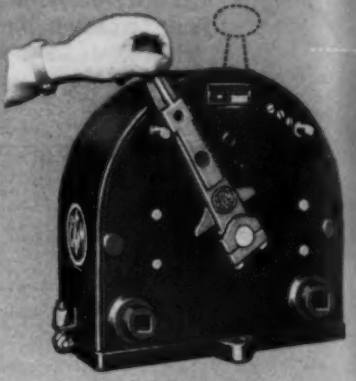
Dun & Bradstreet's trade barometer was rising for the first 2 weeks in December as Christmas grew imminent and cold snapped across the nation. Consumer spending increased moderately over a year ago to give retail sales a boost. November retail sales by rising over October's reversed a downtrend beginning in August. Standing at 131.5 for November, the Dun & Bradstreet barometer was 4 pct above 1952. Meanwhile, Dept of Commerce had a somewhat different tale to tell about department store sales. After November sales just managed to equal 1952, the rate for the first 2 weeks of December submerged to a scant 3 pct below last year. Signals were nevertheless profuse that the 1953 sales year would finish with a roar.

TV inventory overpadded?

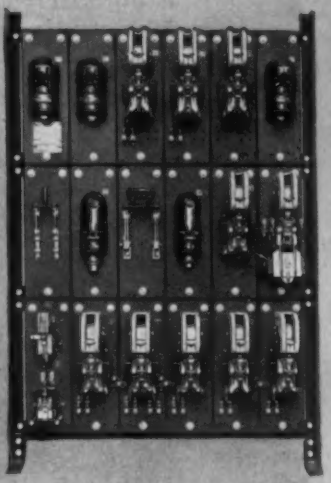
Retail sales of TV sets for the first 10 months this year climbed to a startling 4,922,128 units against 4,291,893 sets for the same period last year. When you consider that the video industry will make in '53 from 7 million to 7.5 million sets, inescapable conclusion is that quite a few sets made this year were shoved into inventory. TV sales passed radio--but not by much. Radio retail sales for the first 10 months stood at about 4.9 million receivers. For a product generally declared senile last year and on its way down, radio sales this year actually showed an increase. Note the value of high fidelity--or a new feature on an otherwise graybeard product.

December 31, 1953

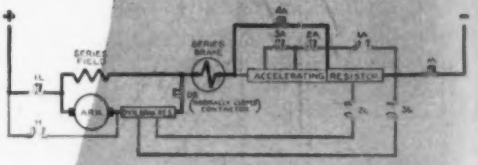
HEAVY LOADS SPOTTED QUICKLY, SAFELY



Speed-control Master Switches have short throw —narrow width—and are convenient for the operator to use.



The Wright Dynamic Lowering Circuit Controller (with protection) for crane-hoists.



First point lowering connections put all the current from the line through the brake for fast release.

Here's Where EC&M CONTROL Gives Unexcelled Results

The EC&M Wright Dynamic Lowering Circuit Controller for crane-hoists is well known for its ability to permit accurate, short movements when spotting a load. The operator has complete control of all lowering speed-points. In setting the cope with this 125-ton crane, quick response through fast brake release enables the operator to close the mold carefully—with a minimum number of movements which maintenance men recognize as a contributing factor to reduced up-keep. The Wright Circuit is safe—specify EC&M Crane Control.

WRITE FOR BULLETIN 921

Photo—Courtesy, Cleveland Crane & Engineering

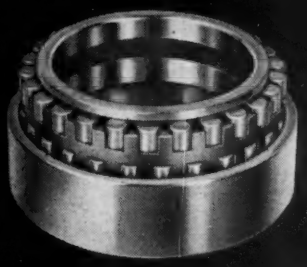
THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Contact KAYDON of Muskegon

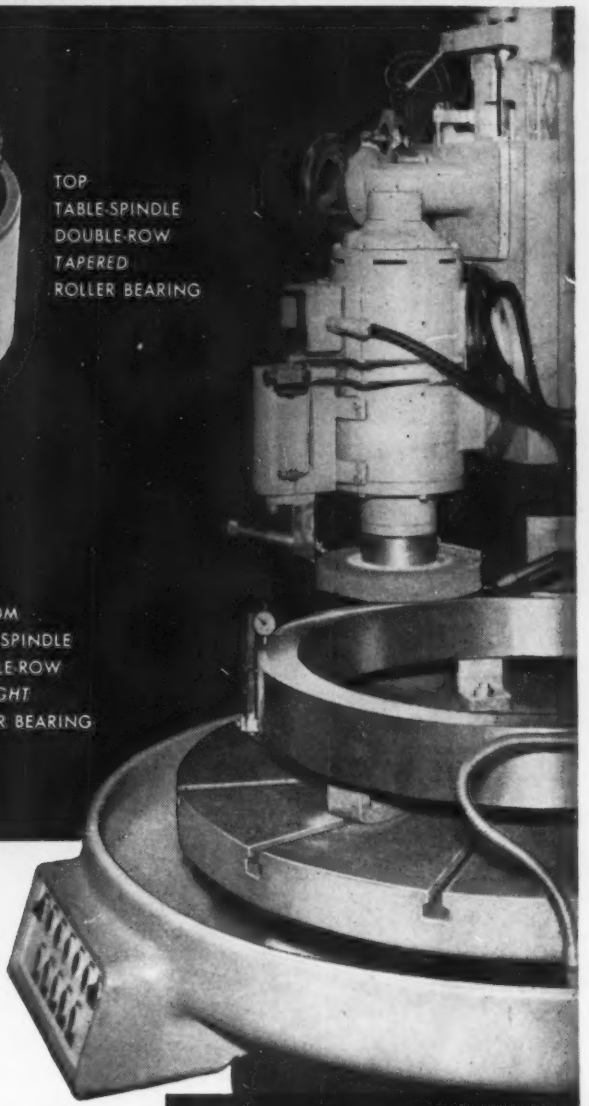
FOR ALL TYPES OF BALL AND ROLLER BEARINGS: 4" BORE TO 120" OUTSIDE DIAMETER

TOP
TABLE-SPINDLE
DOUBLE-ROW
TAPERED
ROLLER BEARING

KAYDON Super-Precision Double-Row Preloaded Bearings used in 48-inch Frauenthal "MILLIONTHS-of-an-inch" Grinders



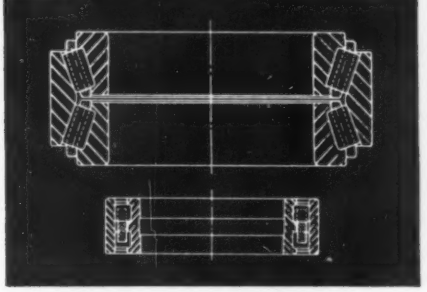
BOTTOM
TABLE-SPINDLE
DOUBLE-ROW
STRAIGHT
ROLLER BEARING



WHY KAYDON Bearings assure millionths-of-an-inch precision with Frauenthal Grinders

WHAT gives Frauenthal Grinders such dependable super-precision performance? Answer: TWO double-row preloaded KAYDON super-precision bearings! *WHERE?* In the table-spindles of these modern "Millionths-of-an-inch" grinders, one KAYDON double-row *tapered* roller bearing at top of spindle, and one KAYDON double-row *straight* roller bearing at bottom (designed to allow for thermal changes without affecting the upper bearing). Both are preloaded oversize bearings. RESULTS: Super-precision grinders vital to production of much of the modern military and industrial equipment responsible for America's leadership.

For machines you *make* to *sell*, or *buy* to *use*, specify KAYDON Bearings. Contact KAYDON at Muskegon.



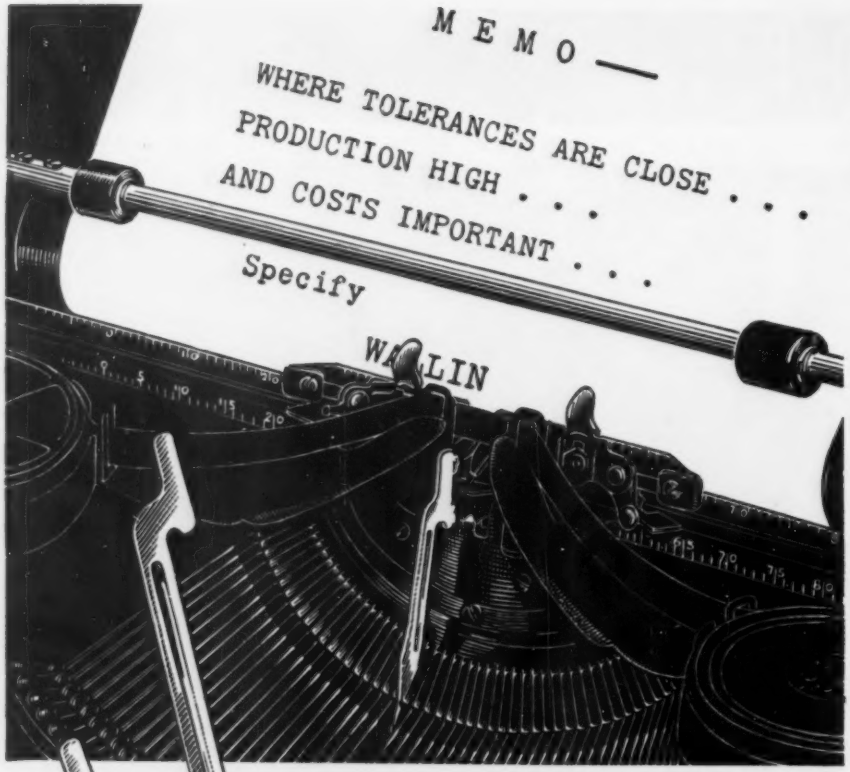
Cross-section showing top double-row *tapered*, and bottom double-row *straight* roller bearings, engineered and produced by KAYDON for Frauenthal Grinders.

THE KAYDON ENGINEERING CORP.

KAYDON Types of Standard and Special Bearings:
Spherical Roller • Taper Roller • Ball Radial • Ball Thrust • Roller Radial • Roller Thrust • Bi-Angular Bearings

MUSKEGON • MICHIGAN

PRECISION BALL AND ROLLER BEARINGS



WALLINGFORD

CLOSE-TOLERANCE

STEEL STRIP

When it comes to precision parts like type bars, leading typewriter manufacturers specify Wallingford Steel Strip. They've found that the smooth surfaces and closely held thickness tolerances mean reduced fabricating and finishing costs and insure accurate spacing with smoother, quieter typing action.

The uniform high quality of Wallingford Steel Strip and Tubing doesn't just happen; it's the result of experience, know-how and a determination to produce the best . . . combined with the finest, most up-to-date equipment available. Our new Sendzimir mill, for example, can roll steel strip down to .002" thick and . . . equipped with the most advanced continuous gages . . . will maintain accuracies to ±.0001".

A growing list of satisfied customers look to Wallingford Steel for those important extra values in product quality and service. You too will find that Wallingford can meet your most exacting specifications for size, finish, analysis and temper . . . and can deliver *what* you want *when* you want it.

Call us today. We will welcome the opportunity to cope with the tough problem.

THE **WALLINGFORD** SINCE 1922 **STEEL** CO.

WALLINGFORD, CONN., U.S.A.

LOW CARBON • HIGH CARBON • ALLOY • STAINLESS • STRIP and TUBING

—Free Publications—

Continued

Oil-burners

Iron Fireman Mfg. Co. has just released 16-p. catalog covering its line of horizontal rotary oil burners, combination oil-gas burners and forced draft packaged burners for oil and combination oil-gas firing. Illustrations and text cover features of the burners, including Oil Volumeter, prewired control panels, ignition system, oil preheating apparatus and forced draft equipment. Publication contains numerous cutaway illustrations and full data on models and capacities. *Iron Fireman Mfg. Co.*

For free copy circle No. 11 on postcard, p. 49.

Electrostatic spray

Ransburg Electro-Coating Corp. has released 16-p. brochure on No. 2 Electro-Spray Process. Available upon request to those concerned with production line painting, this booklet describes how the process works and proves paint and labor savings by case-history presentation of 27 production painting jobs on a wide variety of sizes and shapes of parts and products. Ransburg's laboratory facilities are pictured, and complete information on test procedures is given. *Ransburg Electro Coating Corp.*

For free copy circle No. 12 on postcard, p. 49.

Track materials

Savings in time and money through single-source buying of track materials and supplies are pointed up in new catalog issued by L. B. Foster Co. Featured is general information to aid industry in the ordering and installation of frogs, switches and stands. *L. B. Foster Co.*

For free copy circle No. 13 on postcard, p. 49.

Brake dies

New enlarged die manual is now available from the Verson Allsteel Press Co. Manual is devoted to pictorial presentation of Verson press brake dies and special tooling along with detailed text and tables on how to select dies for specific job and tonnages required. *Verson Allsteel Press Co.*

For free copy circle No. 14 on postcard, p. 49.

CRUCIBLE FINE STAINLESS WIRE...

now available — all sizes... all tempers

Users of fine wire can now obtain prompt delivery of Crucible stainless steel wire . . . in all diameters . . . in all tempers from full hard to dead soft. And Crucible's fine wire comes in all standard grades — with a bright surface or a variety of metallic and nonmetallic finishes tailored to meet your specific application.

Our new fine wire mill is equipped with the latest facilities for annealing, pickling, drawing and finishing. Our mill metallurgical control setup is the latest word, too, to assure you that every spool and coil produced conforms to Crucible's high standard of quality — dimensional, physical and surface uniformity that is unsurpassed in the industry.

No matter what type of wire you use — whether it be cold heading wire, weaving wire, spring wire, needle wire, screen wire, cable wire, or a host of other types — our new mill is equipped to serve you. For prompt delivery of quality stainless wire, call your nearest Crucible warehouse.

CRUCIBLE first name in special purpose steels

53 *years of* Fine *steelmaking*

STAINLESS STEEL WIRE

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 49 or 50.

High-production rate finishing of small parts

Known as the Pressure Blast Roto-Barrel, this unit was designed for the bulk, high-production rate finishing, cleaning or deburring of small parts such as screw machine products, stampings, small castings and extrusions, etc. The work is loaded into the expanded metal, plastisoled barrel and rolled into the interior of the cabinet where the blast gun, in a fixed but adjustable position, aims into the open end. Variable speed drive rated at 0 to 78 rpm rotates the barrel exposing the parts to the blast stream. The barrel is manually rolled out of the cabinet and work is rinsed free of abrasive slurry at the machine. Fabricated of stainless steel throughout, no pumps or mechanisms of any kind are employed in the blast system. *Cro-Plate Co., Inc.*

For more data circle No. 15 on postcard, p. 49.

Load system integrates moving, stacking, storing

Uniformity, efficiency, maneuverability and space saving are features of a unit system of moving, loading, stacking and storing products or parts. The three-unit combination consists of the load unit, an all-steel welded box on legs that allows materials to be loaded, moved and stacked piece-by-piece or in quantity. This unit can be stacked one on the other, and is dimensionally correct to be used with a Load-Mobile fork truck. Rated capacity is 2000 lb. Second factor is a self-contained, all-steel load rack that holds five load units perpendicularly. These racks provide a perfectly balanced rack for the units, will hold 10,000 lb. Third unit is the battery-powered Load-Mobile fork truck which permits flexible maneuverability in narrow aisles and crowded stock rooms. A hand lift truck works with this combination for short hauls and where stacking is unnecessary. *Market Forge Co.*

For more data circle No. 16 on postcard, p. 49.

Greater production at lower cost

Latest developments in the Model B line of vertical motor cone-pulley drilling machines are said to make the machines well suited to the needs of production shop or tool room. Four models now in production have overhang ranging from 7 to 16 in. with wide range of spindle speeds for adaptability to specific work requirements. Drilling capacities are ⅜, 1¼ and 1½ in. for the 1B, 2B and 3B, and 4B models respectively. The choice of single or multiple spindles adds to the versatility of the machines in production work. Regular attachments are available for wider range of work applications. The machines have rugged construction and simplified operation, and combine power, accuracy and speed for fast low-cost production. Work table is ample size for efficient work handling and to permit good work setup. *Edlund Machinery Co.*

For more data circle No. 17 on postcard, p. 49.

Turn Page

SENDZIMIR MILLS
WILL REDUCE YOUR COLD ROLLING COSTS

This Sendzimir Mill rolls 36" wide stainless steel without intermediate anneals. The work rolls are 3 ⅛" in diameter x 42" long.

Sendzimir Reversing Cold Strip Mills Roll Wide, Work-Hardening Strip To Precise Gauge Without Intermediate Annealing

A unique roll arrangement enables a Sendzimir mill to reduce work-hardening metals like stainless steel 90 and 95% without annealing.

The roll separating force is transmitted directly to a one piece steel housing through intermediate rolls and caster type backing shafts. This highly rigid design makes possible the use of small diameter, indirectly driven work rolls which have extra reducing ability.

Write, wire or phone for further details

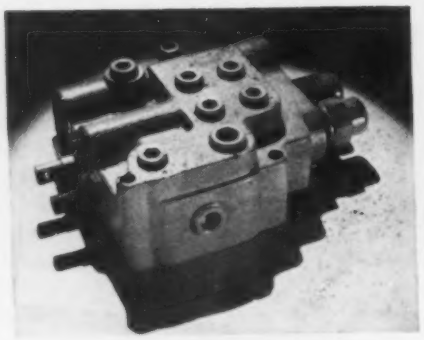
Armzen Company

WATERBURY 64, CONN.

AR-1

OTHER SENDZIMIR MILL ADVANTAGES

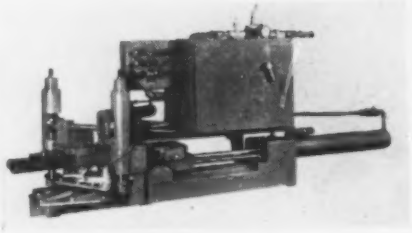
- ★ No limitation as to width of strip
- ★ Rigid backing gives the mill extra ability to maintain close tolerances — an advantage on both ferrous and non-ferrous strip
- ★ Elimination of intermediate anneals also saves handling, reduces inventory and provides a better surface finish
- ★ Compact mill design requires less floor space
- ★ Small working parts make maintenance quick and easy — work rolls can be changed by hand in less than a minute
- ★ Requires smaller investment than conventional mills



Spool slot design features control valve series

A new concept in spool slot design places the new directional control valve series in the ultra-smooth operating class. The spool groove on the valve is coined straight down in a V slot permitting accurate control and smooth metering action. There is full metering in all spool porting. The valve is designed in four sizes to allow flow of 8, 16, 23 or 35 gpm. There are 1, 2, 3 and 4 spool models. Single and double acting spools are interchangeable. In the smaller sizes, the device can control pressures up to 2500 psi. A flexible design allows floor characteristics to be tailored to the user's needs. *Parker Appliance Co.*

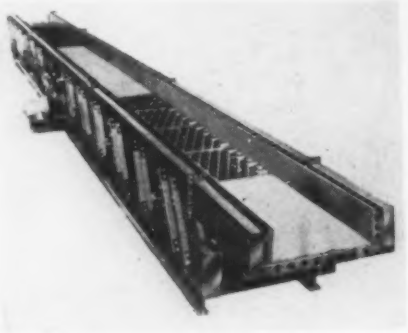
For more data circle No. 18 on postcard, p. 49.



Broaches two non-parallel slots simultaneously

New air powered horizontal broaching fixture simultaneously broaches two non-parallel slots in a die cast aluminum washing machine gear case cover. The ⅛ x ⅛ in. slots which guide control bars, are at a 10° angle to each other. The fixture produces the slots in a fraction of the time required by a former double milling operation. *National Broach & Machine Co.*

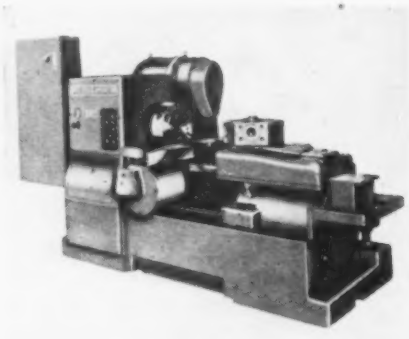
For more data circle No. 19 on postcard, p. 49.



Vibrating conveyor has balanced, dual trough

Bulk materials, hot or cold, dry or damp, abrasive or corrosive, from fine powders to big chunks, can be conveyed or screened, or conveyed, screened and distributed by new balanced, dual trough vibrating conveyors and screens. They are compulsory driven, swinging mass type in which two troughs or screens, mounted one above the other are connected by leaf springs and the whole assembly supported on guide links follows the movement of the eccentric drive. Two capacities are available: 80 tph in 65 ft long x 20 in. wide or 30 ft x 40 in.; 280 tph in sections 175 ft x 20 in. and up to 100 ft x 40 in. wide. *Syntron Co.*

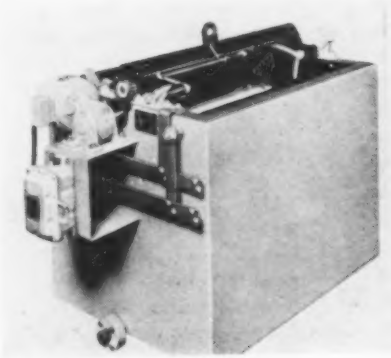
For more data circle No. 20 on postcard, p. 49.



High powered turret lathe takes carbide tools

New powerful automatic turret lathe is designed primarily for rapid removal of metal with modern carbide tools. An 8-in. type A-1 American Standard spindle nose has been adopted for the rugged spindle, taking chuck sizes 10, 12, or 15 in. Four automatic instantaneous speed changes are provided by powerful multi-disk friction clutches electro-pneumatically controlled. Through pick off gears, spindle speeds range from 45.5 to 1177 rpm. Large 6-faced turret is indexed with a smooth acting Geneva movement. Automatic changes of speeds, feeds, rapid traverse and automatic stopping are controlled from a dog drum. *Potter & Johnston Co.*

For more data circle No. 21 on postcard, p. 49.



Improved plating tank assures efficient handling

With the exception of chrome plating, any type plating may be carried out in the new Mercil-type tank for barrel electroplating. Compact, streamlined construction results from flanges being turned in, saving space and providing an enclosure for hanging heating or cooling coils. Motor drive is more compact and relocated. The drive shaft is located above solution level; no leakage is possible through shaft openings in the tank wall. Redesigned saddles permit operator to guide the barrel into position more easily. Two size tanks have capacities of 224 and 225 gal. *Hanson-Van Winkle-Munning Co.*

For more data circle No. 22 on postcard, p. 49.

Turn Page

What! No Ice Cubes?

This situation would be enough to drive anybody to drink—water, that is. Yet it shows, in dramatic fashion, how important fasteners are to refrigerators.

Of course, this will never really happen to any modern refrigerator, thanks to the constant fastener research carried on by Lamson & Sessions in cooperation with leading appliance manufacturers.

But there *is* a moral to this story: When you select fasteners for any product, it will pay you to consult Lamson *first.* If the answer isn't already in our files, our years of experience in helping manufacturers select the "just right" fastener for their products, can be of immeasurable value to you.

Lamson + Sessions

The LAMSON & SESSIONS Co.
1971 West 85th St. • Cleveland 2, Ohio
Plants at Cleveland and Kent, Ohio • Birmingham • Chicago

FOR PROMPT DELIVERY AND HELPFUL SERVICE, ORDER FROM YOUR LAMSON DISTRIBUTOR

MACHINE SCREWS
Precision made for fast, economical assembly.

PLUG NUTS
Ideal for blind or hard-to-reach places.

TAPPING SCREWS
Choice of round, pan, truss, flat oval hexagon and Phillips heads.

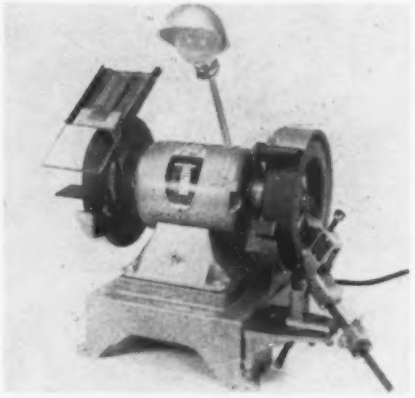
CAP SCREWS
"1035" Hi-Tensile Heat-treated steel.

SQUARE AND HEX MACHINE SCREW NUTS
Semi-finished, hot pressed, cold punched.

LOCK NUTS
Economical, vibration proof. Can be used repeatedly.

COTTER PINS
Steel, brass, aluminum and stainless steel.

"1035" SET SCREWS
Cup point type, hardened and heat-treated.



New 3-in-1 grinder takes work out of sharpening

Simplicity, convenience, accuracy and speed are emphasized in the design of a new, low cost, wide range tool and drill grinder. Twist drills from No. 60 wire size to ¾ in. are quickly and accurately pointed and sharpened with this new unit. It permits the grinding of point angles from 45° to 75°, clearance angles from 6° to 15° and chisel point angles from 117° to 135°. Drills are held and positioned in a fixture that simplifies the setting of angles, permitting inexperienced and unskilled workers to obtain good grinds. Grinder is equipped with rough wheel for grinding tools down rapidly to approximate angles. They can be accurately finished on the other wheel using the fixture. Average sharpening time for a drill is less than 1 min. *DoAll Co.*

For more data circle No. 23 on postcard, p. 49.

SHELDON
CHICAGO U.S.A.

OFTEN PAYS OUT ON THE FIRST JOB...

and gives additional years of "cost free" service.

In the past, lathes were generally bought as large and as heavy as possible to insure accuracy and sufficient power. Now, with accurate, low-cost Sheldon Precision Lathes, it is more profitable to buy these faster, cost-cutting lathes for the specific job at hand just as you would buy jigs and fixtures.

In savings of tooling costs, operator cost, power cost, and plant loading, as well as extra profits from more pieces per hour, Sheldon Lathes often pay back their cost on a single run.

Sheldon Lathes will work to the closest tolerances—have "Zero Precision" Taper Roller Bearings. They can take a healthy cut when operating at high speed direct drive—have double V-belts to the spindle. They will swing 10", 11" or 13" and have a 1⅝" hole through the spindle—have sufficient capacity for the great bulk of lathe work. Sheldon Lathes have created a new factor for figuring machinery costs. They are tools you should know about.

Write for Catalog

SHELDON MACHINE CO., INC.
4224 N. Knox Ave. Chicago 41, Illinois

Caulking compound

Easy-to-use caulking compound is supplied in tape form. It has a soft, moldable consistency with a thread core that prevents stringing out or sagging when unrolled. Primary application is joint sealer against moisture, wind, dust and cold. When placed between two surfaces, and light pressure is applied, the compound distributes itself evenly throughout the joint. Offers additional values as a "plugging" compound. *Products Research Co.*

For more data circle No. 24 on postcard, p. 49.

Magnetic chucks

Superpower permanent magnet chucks feature reduced height providing increased clearance between wheel and chuck. They utilize the latest developments in special alloy magnet material to achieve maximum power, and under normal conditions will retain their peak energy indefinitely. Holding power is controlled by progressive positioning of the hand lever, from minimum to maximum, providing advantages in holding certain types of work without distortion. Since no electrical current is applied the chuck operates without heat, another factor in eliminating warping of workpieces. *Taft-Peirce Mfg. Co.*

For more data circle No. 25 on postcard, p. 49.

The Iron Age

SALUTES

Walter F. Munford

Refusing to bother with short cuts, he has always depended on hard work to make him a wire industry leader.

IN his balmiest day Horatio Alger never created a fictional local boy who made good in a bigger way than Walter F. Munford. When he returns to his home town of Worcester these days the president of American Steel & Wire comes back as head of the firm which hired him as a die reamer in 1919. Walter was a student then at Worcester Polytechnical Institute and earning tuition money kept him busy 13 hours a day, 6 days a week.

Following a short stint as a potato-peeling merchant seaman and student days at Massachusetts Institute of Technology Walter started his career as an open-hearth helper in the Wire Div.'s South Works at Worcester.

During 30 years with the same firm Walter has relied mainly on hard work and an ability to get things done. He isn't a man who takes kindly to endless conference wrangling. When discussion bogs down he puts a quick finger on the heart of the problem and says, "Let's go to work."

Close business associates say this talent for quick analysis hasn't made Walter an abrupt executive. Instead he has earned a reputation for being able to pour oil on troubled corporate waters when tempers are frayed.

Walter's business philosophy is built around hard work and no short cuts. He says he learned these and other valuable lessons from his mother, a Pennsylvania Quaker.

When he isn't trying to map out a way for the Cleveland Indians to depose the New York Yankees in the American League Walter spends his leisure time swimming and surf casting with his wife or touring the golf links.

Wickwire oil tempered wire . . .

STEEL RIBS FOR HEAVY UMBRELLAS, TOO

Not all oil tempered wire is used for springs. A typical example of its diversified applications is the familiar beach umbrella, also used on lawns and terraces, and in modified form on tractors, bulldozers and similar equipment.

For the steel ribs of these heavy umbrellas many manufacturers find Wickwire oil tempered wire ideal. This wire is stiff so as to retain its shape; uniform so that all wires bend the same; flexible so that the wires follow the contour of the umbrella; and ductile so that they may be easily swaged.

Wickwire oil tempered wire is available in a size range from .007″ to .5625″. Round wire can be supplied in coils or cut lengths. Wickwire also manufactures flat tempered wire.

High or low carbon steel . . . in all tempers, grades and finishes—For the Wire You Require; Check First With Wickwire.

THE COLORADO FUEL AND IRON CORPORATION • Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION • Atlanta • Boston • Buffalo
Chicago • Detroit • New Orleans • New York • Philadelphia

WICKWIRE WIRE

CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

1944

The Iron Age

INTRODUCES

J. Lawrence Buell, Jr., elected president, general manager, and director, THE FORMSPRAG CO., **Van Dyke,** Mich.; and **David A. Wallace,** elected to the board of directors.

Wallace R. Persons, elected president and a director, EMERSON ELECTRIC MANUFACTURING CO., St. Louis.

W. Scott Fraula, elected vice-president for labor relations and operations including engineering and mechanization, AMERICAN BRAKE SHOE CO., New York.

Clarence E. Killebrew, elected vice-president, CLARK EQUIPMENT CO., Buchanan, Mich.

W. Randle Mitchell, elected vice-president, THE AMERICAN PULLEY CO., Philadelphia; and **H. Merrill Bowman,** elected vice-president.

Ernest D. Fischer, appointed manager, new Atlanta factory branch office, THOR POWER TOOL CO., Aurora, Ill.

Arch R. Smith, named vice-president and general manager, Grand Rapids branch, THE FRANK COLKER CO., Detroit.

L. L. Garber, elected a director, vice-president and general manager, THE ALLOY METAL WIRE CO., Prospect Park, Pa., division of H. K. Porter Co., Inc.

Walter F. Rockwell, elected chairman of the board, ACRO MFG. CO., Columbus; and **F. G. McCloskey,** named president.

Theodore P. Witkowski, becomes engineer, metallurgical process and quality control unit for permanent magnet materials, Edmore, Mich., plant, CARBOLOY DEPT., General Electric Co., Detroit.

Robert G. Dee, appointed industrial sales engineer, Los Angeles Area, THE PARKER APPLIANCE CO., Cleveland; and **Herbert H. Walley, Jr.,** appointed industrial sales engineer, Boston and Upper New England area.

William H. Fellows, promoted to sales coordinator, Westboro, Mass., office, BAY STATE ABRASIVE PRODUCTS CO.; and **Richard P. Brown, Jr.,** named manager, Chicago district.

Albert W. Groesbeck, appointed assistant superintendent, Electrical Dept., REPUBLIC STEEL CORP., Warren, Ohio, district steel plants.

Dr. Charles J. Kentler, Jr., named technical consultant, Meter & Valve Division, ROCKWELL MANUFACTURING CO., Pittsburgh.

Edward R. Bartos, joins sales and service staff, Detroit office, WYANDOTTE CHEMICALS CORP., Wyandotte, Mich.

Robert E. Byrne, appointed chief engineer, WORCESTER PRESSED STEEL CO., Worcester, Mass.; and **Charles T. Mooney,** appointed production superintendent.

David B. Stockton, named resident sales engineer, new warehouse, Rockford, Ill., UDYLITE CORP.

Ernest A. Fentzlaff, appointed sales engineer, for sales to the aircraft industry, CONSOLIDATED INDUSTRIES, West Cheshire, Conn.

W. M. Fine, appointed manager, St. Paul District office, WORTHINGTON CORP., Harrison, N. J.

William B. Greene, appointed personnel manager, Union Steel Castings Division, BLAW-KNOX COMPANY, Pittsburgh.

EDWARD C. LOGELIN, named vice-president, U. S. Steel Corp., Chicago.

F. P. MAXWELL, named vice-president, Rockwell Mfg. Co., Power Tool Div., Pittsburgh.

DR. ADOLPH J. LENA, appointed associated director of research, Allegheny Ludlum Steel Corp., Pittsburgh.

L. G. Jones, appointed manufacturing manager, Canton Div., E. W. BLISS CO., Canton, Ohio.

David G. Stenberg, named Central division manager as of January 1st, NATIONAL GYPSUM CO., Buffalo.

John A. Swint, appointed manager, Livonia, Mich., plant, FORD MOTOR CO., Automatic Transmission Division; and **Wycliffe W. Winn**, appointed assistant manager.

John H. O'Toole, appointed general sales manager, GENERAL ELECTRIC APPLIANCES CO., Louisville, Ky.

John Munson, becomes superintendent, Blast Furnaces, COLORADO FUEL & IRON CORP.

S. S. Jacobs, design supervisor, Closing Machine Dept., AMERICAN CAN COMPANY, retired recently.

Kermit D. Collom, and **Stanley E. Jacke**, appointed to the staff of the new Ultrasonics Div., DETREX CORP., Detroit.

J. E. Cottier, traffic manager; **Robert M. Crawford**, Fleet Captain; and **T. A. Ives**, Fleet Engineer of the Pittsburgh Steamship Div. of U. S. STEEL CORP., will retire shortly.

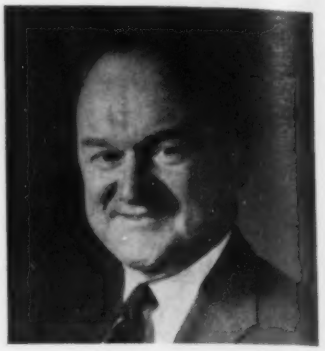
A. J. Belanger, appointed sales manager, PIONEER ENGINEER WORKS, INC., Minneapolis.

G. N. Harmon, named superintendent, Electrical Dept., REPUBLIC STEEL CORP., Youngstown steel plant; and **R. C. Stern**, made superintendent, Masonry Dept.

Martin J. Caserio, becomes chief engineer, automotive products, Engineering Dept., A. C. Spark Plug Div., GENERAL MOTORS; and **Bruce H. Schwartz**, appointed chief engineer, military products.

Frank M. Hunter, appointed service engineer, ACHESON COLLOIDS CO., Port Huron, Mich.

Dr. George E. Duvall and **Dr. Charlott Z. LeMay**, two research physicists, have joined the staff of STANFORD RESEARCH INSTITUTE.



JOHN W. BODWELL, appointed manager, Work Order Dept., Chicago plant, Joseph T. Ryerson & Son, Inc.

GEORGE F. GROFF, appointed controller, Crucible Steel Co. of America, Pittsburgh.

DONALD R. McPHAIL, appointed materials handling engineer, Detroit District sales office, Pittsburgh Steel Products Co.

R. R. WILLIAMS, JR., appointed assistant manager, Mining Dept. Colorado Fuel & Iron Corp.

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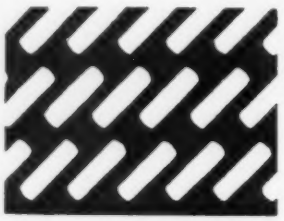

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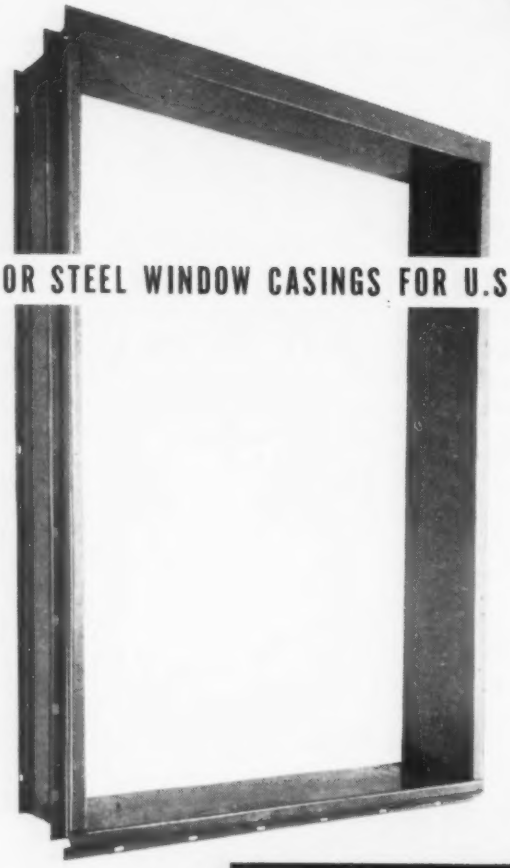

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—Personnel—

Continued

Joseph E. Thornberg, made technical sales service field representative, HOOKER ELECTRO-CHEMICAL CO., Niagara Falls; and **Delmont J. Boundy** and **Henry R. Morrison,** have been advanced to positions in the sales-production coordination office, Sales Dept.

Lowell H. Miller, named a Pacific Regional industrial representative, Los Angeles, THE GLIDDEN CO.

George R. Forbes, Jr., joins New York sales staff, L. B. FOSTER CO.

Robert W. Murdock, appointed commercial product salesman, Chicago territory, CORY CORP.

Gordon E. Lloyd, appointed traffic manager, GERRARD STEEL STRAPPING, a division of U. S. Steel Corp., Chicago.

Curtis I. Kahler, appointed honing equipment sales engineer, Midwest and Eastern territories, BARNES DRILL CO., Rockford, Ill.

James McKay, Jr., appointed sales manager, Lyco Machine Works, Oakland, Calif.

Sam DuPree, made general manager of all industrial products, GOODYEAR TIRE & RUBBER CO., Akron; and **Herman R. Theis,** made general manager of all chemical products.

John P. Tansey, appointed national service manager, MOTOROLA'S Communications and Electronics Div.

OBITUARIES

Hugo J. Kurtz, 67, founder and chairman of the board, Peninsular Steel Co., Detroit, recently at Jennings Hospital.

Albert G. Lindsay, prominent international business man and manager, Rockwell Manufacturing Company's Export and International Divisions, recently after a brief illness.

Arthur M. Duncan, 67, purchasing agent, THE RUST ENGINEERING CO., Pittsburgh, of heart failure in Allegheny General Hospital, Pittsburgh.

William T. Coholan, 68, manager of steel sales, Stanley Works, Bridgeport, Conn., recently at New Britain General Hospital after a lingering illness.

The Iron Age
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Technical Articles

HOT OIL QUENCHING

Toughens Tractor Shovel Parts

By R. H. Marshall
Chief Materials Engineer
The Frank G. Hough Co.
Libertyville, Ill.

◆ Tractor shovels, by repeated back and forth movement in service, subject gears, pinions, shafts and other parts to intermittent peak stress loads . . . To meet these conditions, such parts are now quenched in 300°F oil after carburizing . . . Sliding parts which undergo little stress receive only a thin, hard case by dry cyaniding.

◆ Two controlled-atmosphere furnaces and one forced-convection draw furnace have improved quality, increased production and cut costs . . . One man operates the entire installation . . . All facilities are connected by a roller table traveling on tracks.

◆ GEARS for tractor shovels entail unusual design and production problems because their service life subjects them to repeated starting and stopping, and forward and reverse movement, under intermittent peak stress loading. In an effort to improve their service life, the Frank G. Hough Co., Libertyville, Ill., tried quenching these gears in hot oil rather than by the conventional method. Pilot runs not only pointed to definite advantages in work quality, but showed the process to be practical, with proper furnace equipment, for volume production.

A 2000-lb per day volume includes such parts as tranmission gears, shafts, shifter rails and trunnions which are case carburized. Bushings, hinge pins and other parts, due to service requirements, receive only a shallow case of the cyanide type.

Production volume and the type of processing pointed to the use of batch-type high-production controlled-atmosphere furnaces. Two Allcase furnaces, made by the Surface Combustion Corp., Toledo, were installed. Each has an effective hearth area of 24 x 366 in. and design heating rates of up to 500 lb per hr gross. They are equipped with gas-fired suction-type radiant tubes, recirculating fans and enclosed oil quench tanks with propellor-type agitators.

The prepared atmosphere gas for each furnace is provided by a fully-automatic endothermic MRX generator. It produces a carrier gas which is neutral to medium-carbon steels.

For drawing and tempering operations, a Forc-Aire convection furnace of the horizontal hearth type, was installed in line with the controlled-atmosphere furnaces. The entire facility was connected by a roller table traveling in tracks on the floor. With the draw furnace at

"Special quenching fixtures or presses are not needed because distortion is at a minimum . . ."

one end of this track and a gravity roll-out table at the other for holding trays of work, a compact and complete one-operator heat treating facility resulted.

Parts are handled only when loaded in baskets or on trays. They are not handled again until after all heat treating, degreasing and drawing operations have been completed. Work trays, with either fixtures or baskets, are used for all production. The trays fit all furnaces and are interchangeable. A tray-fixture setup for marquenching operations provides enough racking flexibility to accommodate a wide range of gear sizes.

Dimensional accuracy of a finished gear was a primary goal in improving gear performance. For this reason, heat treating facilities had to maintain the machinery accuracy. Mass marquenching had been proved capable of this and was chosen to do the job. In this choice, consideration was also given to parts like bushings which are known to distort appreciably during conventional quenching procedures.

Due to these problems, one Allcase furnace is used for hot oil or marquenching operations. It is equipped with an extra-large quench tank and twin agitators operated only during the quenching portion of the cycle. Gas-fired immersion burners, operated by off-on control through a millivolt meter controller, keep the oil temperature at 300°F. Any negligible temperature rise from quenching each hot load is effectively dissipated by recirculation of the oil. This furnace also has an ammonia connection for dry cyaniding carbon steel parts.

After bringing a charge to a temperature of 1700°F, it is held for 3 hr in a carburizing atmosphere of 0 to 7°F dew point. This is followed by a diffusion period of 3 hr in a leaner atmosphere of 8 to 12°F dew point before quenching directly into the 300°F oil from an atmosphere-filled quench vestibule. While this furnace charge is resting in the quench tank, the next load is charged. After removal from the quench, trays of marquenched parts are held on the adjacent gravity run-out table during a specified transformation period.

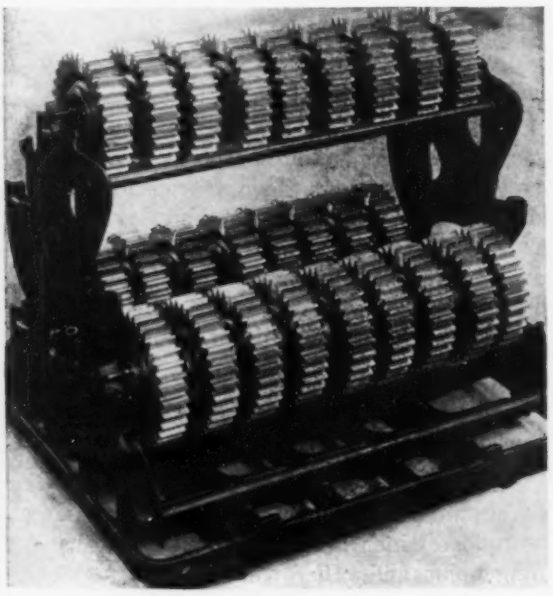
No degreasing is necessary

The resulting case depth on SAE 8622H and 6120 steels is usually about 0.044 to 0.052 in. with 0.80 to 0.95 pct C and 2 to 5 pct retained austenite at the surface. Hardness, as quenched, is between 662 to 656 Rc. The case is checked daily for hardness, depth and microstructure.

After a 4 or 5-min period in the hot oil, the charge is removed by raising the quench elevator and pulling the coupled trays through the vestibule door onto the movable charge table. The table is then moved directly to the front of the forced-convection draw furnace and pushed into the heating chamber on roller rails on the hearth.

Parts need not be degreased. They are drawn at 340 to 375°F for 1½ hr. Hardness after the draw is between 58 to 62 Rc. Work withdrawn from the quench is bright, and completely free of scale, soot and discoloration. Carbon-steel

GEARS, PINIONS AND SHAFTS are typical of parts marquenched after carburizing. Dimensional accuracy of parts is maintained.



TRAY-FIXTURE SETUP for marquenching provides enough racking flexibility for many sizes of gears. Trays are used for all production.

parts turn to the characteristic color of the tempering operation. Extra operations normally required, such as straightening, honing and cleaning, have been virtually eliminated on these parts. Centerless grinding on bushings and shafts is done without difficulty.

Because rejects due to distortion are at an absolute minimum in the as-quenched condition, special quenching fixtures or presses are not required. This cuts down on operating costs and also frees an operator for other work.

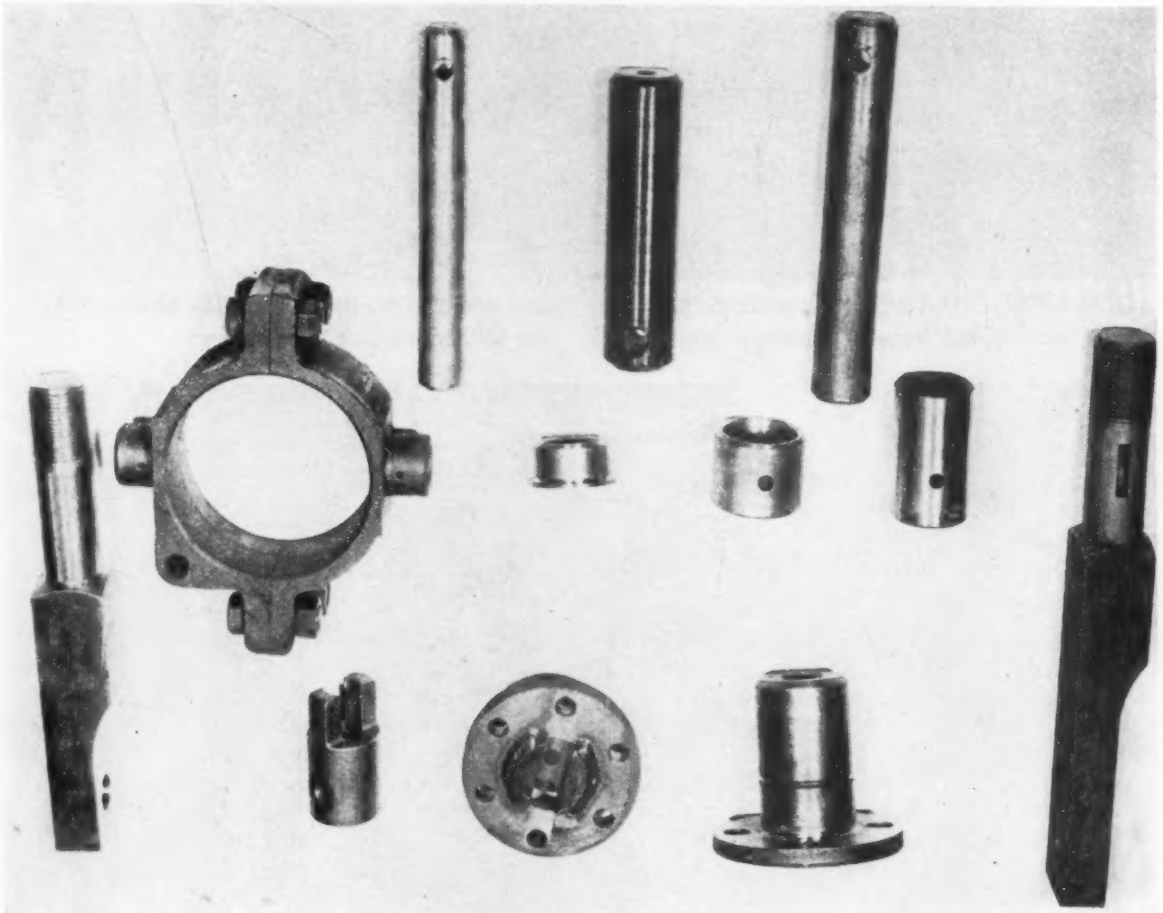
The marquenching type of oil used is checked monthly for sludge, viscosity and any evidence of deterioration or breakdown. This oil has a flash point of 353°F, a fire point of 600 to 625°F and a viscosity of 120 SSU at 210°F. After 2376 hr of continuous use, the viscosity was only 125 SSU at 210°F. The neutralization number had increased during this period from 0.28 to 0.56. Life of this oil is expected to be 9 to 12 months under present loading and operating conditions.

A hard, thin cyanide case is used for parts that undergo excessive surface sliding or friction wear but only a minimum of stress. Since the addition of nitrogen to steel increases hardenability, plain-carbon steels can be substituted for alloy steels and dry cyaniding carried out at lower temperatures, reducing distortion and cracking. The resulting highly uniform wear-resistant case is ideal for the bushings, hinge pins, trunnions, shifter rails and other parts used in tractor shovels. They are made of SAE 1025 and 1141 steels.

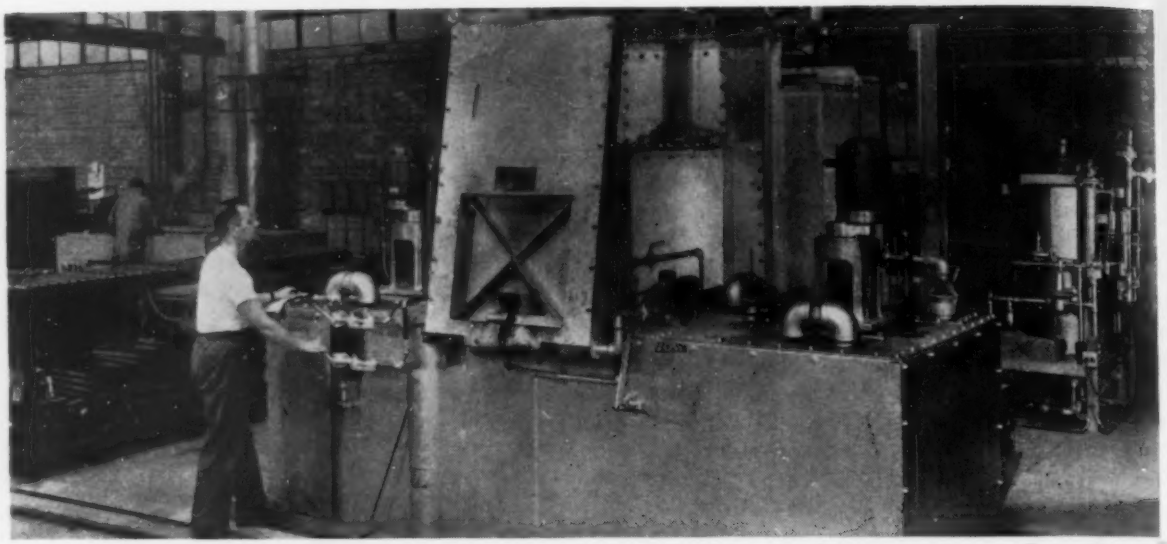
FURNACE OPERATING CYCLE

When furnace charge is ready to quench and quench mechanism is in raised position:

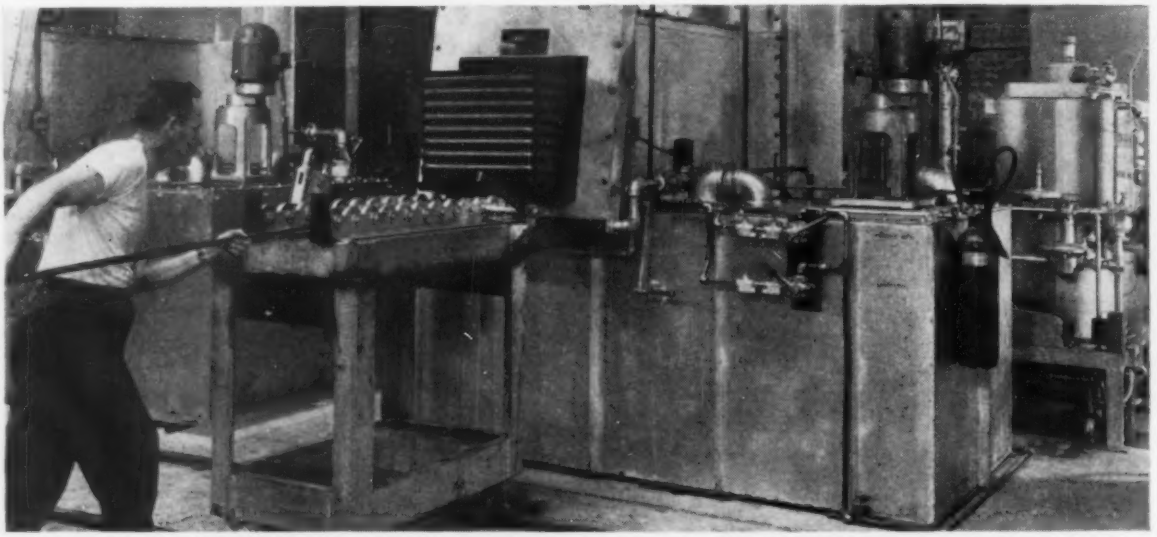
1. Furnace door opens.
2. Charge is drawn from furnace onto lower deck of quench mechanism.
3. Furnace door closes.
4. Quench mechanism lowers.
5. Vestibule door opens.
6. New charge is pushed onto upper deck of quench mechanism in vestibule.
7. Vestibule door closes.
8. New charge is left in vestibule until after complete purge by prepared atmosphere.
9. Furnace door opens.
10. New charge is pushed from vestibule into furnace.
11. Furnace door closes.
12. Quench mechanism raises.
13. Vestibule door opens.
14. Quenched charge is removed from vestibule.
15. Vestibule door closes to complete cycle.



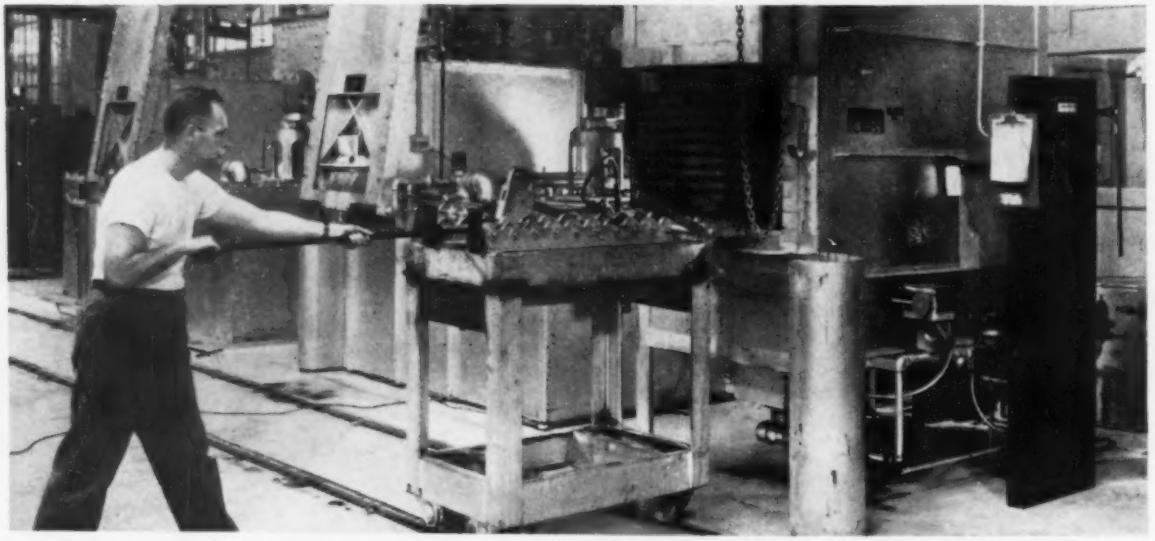
BUSHINGS, HINGE PINS and other such parts for Payloader tractor shovels are made of SAE 1025 and 1141 steels. They receive only a thin cyanide case since they undergo little stress.



MARQUENCH FURNACE heat treats gears, pinions and other parts subjected to peak stress in service. This furnace has an ammonia connection for the dry cyaniding of carbon steel parts.



OPERATOR CHARGES dry cyaniding furnace with two coupled trays of bushings, hinge pins and other parts requiring only a thin, hard case. An MRX generator is at the right.



DRAWING AND TEMPERING operations are performed in a forced-air convection furnace connected to the controlled-atmosphere furnaces by a roller table which travels on tracks.

Although both furnaces are equipped with ammonia connections, the second Allcase furnace is used primarily for dry cyaniding operations. The MRX generator which produces the atmosphere carrier gas is located directly behind the furnace. The gas is introduced through the furnace arch near the recirculating fan. Enriching natural gas and ammonia are added before it enters the furnace. Furnace atmosphere gas will usually consist of 400 cu ft per hr of RX, 50 cu ft per hr of methane and 20 cu ft per hr of ammonia. Dew points are +10 to 15 at the generator and from +15 to 25 in the furnace.

Three basic cycles are used for carbonitriding operations. Best results with these cycles are obtained when the enriching natural gas and ammonia are shut off about 10 to 30 min before quenching to provide a diffusion period.

Use of hot oil for the quench after carbonitriding shows definite advantages approaching the ultimate in dimensional characteristics. Where previous quenching in conventional oil satisfactorily retained the mean dimensions of bushings, hot-oil quenching practically eliminated the slight out-of-roundness usually encountered. Bushings measuring 2.884 to 2.886 in. before heat treatment, quenched out of 300°F oil at 2.8845 to 2.8865 in. Case depth and surface hardness were not affected by this milder quench.

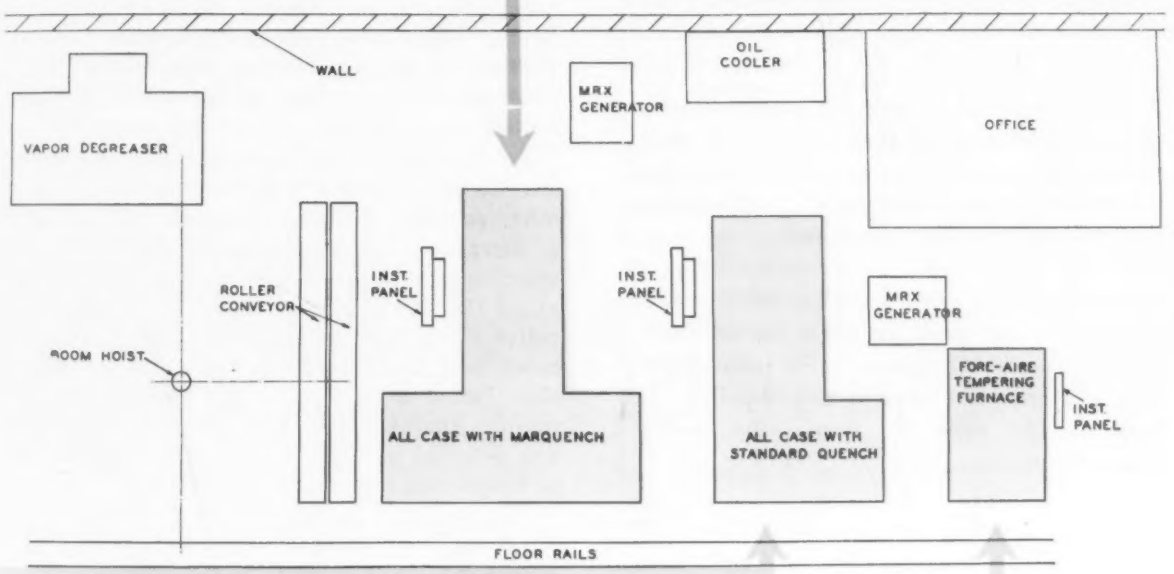
Although all dry cyaniding operations involve an oil quench, it is simple to use the lower temperature cycle and eliminate the quench, or resort to hot oil quenching. This can be done by merely varying the atmosphere composition and either pulling the charge into the quench vestibule for cooling in atmosphere or directly out the vestibule door to cool in room air.

Adequate capacity and process flexibility are provided for present and future requirements by use of the batch-type controlled-atmosphere furnaces. All types of controlled-atmosphere processes can be carried out with or without quenching. The radiant tubes and recirculating fan permit high capacity processing, and the enclosed quench with agitator permits rapid quenching of heated parts without exposure to room air.

Installation is simple. No pits or special floor construction are necessary for the furnaces, and generators only require connection to the utilities. If necessary, any of these units can be easily moved. Furnaces dismantle into three main sections—the quench tank, quench vestibule, and furnace. Generators are complete self-contained units.

Marquenching techniques have reduced distortion to the point where die and fixture quenching could be eliminated on all production, including large gears. This condition holds for both carburizing and dry cyaniding. Uniformity of results are high and rejects are at an absolute minimum. Parts cleaning due to surface contamination is now unnecessary.

COMPACTNESS IN LAYOUT and provisions for work-carrying devices have made these heat treating facilities a one-operator setup. Roller table traveling on tracks connects main units.



Non-destructive test—

NEW METHODS Determine

By Nicholas Grossman
Section Head
Atomic Energy Div.
Sylvania Electric Products, Inc.
Bayside, N. Y.

• The grain size of a metal is a good indication of its inherent physical character . . . Because the test for grain size is a destructive one it has been used only as a spot check . . . Ultrasonics can make it a non-destructive test.

• Wave length to grain size ratios within certain ranges show that grain size has a marked effect on the transmission qualities . . . For ratios above 30:1 no change was noted in transmissibility . . . Below a 10:1 ratio the transmission quality diminished rapidly.

• ULTRASONIC TECHNIQUES are widely used in the non-destructive testing and inspection of castings, forgings, pipe and machine parts. High frequency waves detect and locate flaws, inclusions, porosity and other internal defects. Shop people have long known that the "true ringing" of a piece of metal struck with a hammer is a simple test for interior soundness. Ultrasonics is a refinement of this principle. It can also be used to determine the grain size of a metal.

Work done for the Atomic Energy Commission by Sylvania Electric Products, Inc., Bayside, N. Y., using brass rods shows how grain size can be determined ultrasonically. With this method grain size in fabricated metal parts can be ascertained without destroying the part. Parts in use at elevated temperatures can remain in service longer if their internal physical condition is found sound. This non-destructive method may make faster grain size determination possible in the regular control of production, permitting increased efficiency and quality.

Sylvania used rolled alpha-brass rods of known composition and structure to determine the effects of grain size on ultrasonic transmissibility. Heat treated samples yielded a series of specimens with an average grain size from 0.015 mm to 0.150 mm (10 to 1 ratio). The Sperry Ultrasonic Reflectoscope was used at 2¼ mc, 5 mc, and 10 mc frequencies. Both pulse-echo and continuous transmission techniques were studied.

As the ratio of the wave length to the grain size decreased below a certain value, and the other variables remained constant, the amount of ultrasonic energy diminished. The range of wave length to grain size covered was from about 100:1 to 5:1. At wave length to grain size ratios above 30:1 the transmissibility remained essentially unaffected by variations in grain size. Below a 10:1 ratio the transmissibility rapidly diminished in intensity. No difference was detected between the pulse-echo technique or continuous transmission methods.

The chemical composition of the 1½ in. round brass rod used in these tests is 64.1 pct copper, 3.5 pct lead, 32.4 pct zinc.

Cylinders 2½ in. long were cut from the bar and heat-treated at 1500° F for different lengths of time. The heat treatment time required to obtain these specimens is listed in Table I. To prevent loss of surface zinc, specimens were

TABLE I

TREATMENT, GRAIN SIZE, HARDNESS

Specimen No.	Time at 1500 °F	Average Grain Size, mm.	Hardness, Rockwell
1	0	0.015	C - 9; B71
2	15 min.	0.025	C46
3	45 min.	0.035	C44
4	90 min.	0.045	C44
5	8 hrs.	0.065	C41
6	24 hrs.	0.090	C40
7	96 hrs.	0.150	C38
A	0 *	0.015	C - 3; B77

* Axially compressed to 10 pct permanent deformation.

Grain Size Ultrasonically

wrapped in brass foil and annealed in an argon atmosphere. After heat treating, a thin disc was cut from each specimen and examined for grain size. The grains were found randomly oriented and uniform. The average grain size and indentation hardness measurement taken across the diameter of the disc samples are shown in Table I. For comparison, negative hardness values are listed in two instances.

The heat treatment resulted in six specimens with grain sizes from 0.025 mm to 0.150 mm. One specimen left in the as-received condition had an average grain size of 0.015 mm. All seven specimens were finish machined to 2 in. length.

Different testing techniques

To determine the possible effects of prior stress history one specimen was cut from the original brass bar and axially compressed to 10 pct permanent set.

The Sperry Ultrasonic Reflectoscope Model UR designed for one crystal or two crystal operation was used for this investigation. Three different testing techniques were used and all gave consistent and congruent results. For detailed analyses the one crystal or pulse echo method was utilized. This appeared most reproducible and easily measured.

In the one crystal method of measuring the amplitude of the first back reflections, the crystal was placed on the base of the cylindrical specimen and after proper electronic adjustments the reflectograms (photographs of the cathode ray tube) of the smallest grain sample was taken. This absorbed least energy, had highest transmission quality and gave highest back reflection. Without changing any of the test conditions, the same procedure was then repeated for all the test samples. When it was desired to switch to another frequency the electronic circuit was readjusted and the same test series performed.

To observe whether the testing procedure had any influence on the results, a continuous wave was sent out by placing the transmitting crystal on the base of the cylindrical samples and the receiving crystal on the opposite face. Except for this two crystal technique the testing procedure remained essentially the same as the pulse-echo method.

The number of back reflections for a given constant setting of the Reflectoscope for the selected frequency was used. In these tests the height of the back-reflection was unimportant, and the measurements were oriented toward the determination of the number of visible multiple reverberations.

Of the methods described above, the multiple back reflection technique proved to be most useful from a practical standpoint. Impurities or internal defects which influence the amplitude of the reflections do not affect the number of multiple reverberations. This technique yielded consistent and reproducible results and was used in evaluating the data.

TABLE II

SETTINGS FOR AMPLITUDE

Testing Technique	Pulse-echo Method	
Frequency	2¼ mc	5 mc
Sensitivity	3	3
Sweep Length	0	0
Pulse Length	0	0
Pulse Tuning	7	3
Marker	Off	Off

TABLE III

SETTINGS FOR MULTIPLE BACK REFLECTIONS

Testing Technique	Pulse-echo Method		
Frequency	2¼ mc	5 mc	10 m
Sensitivity	2.5	3.5	3.5
Sweep Length	6	5	4.8
Pulse Length	0	0	0
Pulse Timing	5	4.8	4.5
Marker	Off	Off	Off

Transmissibility, as measured by back reflections, is essentially constant for wave length to grain size ratios over 30 to 1 . . .

A typical set of reflectograms showing the ultrasonic reflections as a visual pattern are illustrated in Fig. 1. The particulars of the tests are given in Table II.

This method of measuring the height of the first back reflection as a relative measure of transmissibility appeared very promising because, as in all wave motions, the energy is proportional to the square of the amplitude. Tests performed at 1 mc, 2¼ mc, 5 mc and 10 mc frequencies all showed the same general trend: for a given setting of the reflectoscope the amplitude of the reflection remained essentially the same and then as the ratio of the wave length to the grain size approached about 5 to 1 the amplitude rapidly diminished.

To get the most clear indications, laboratory techniques instead of recommended commercial practices were frequently used. Abnormally large grains were produced, frequencies were chosen which were not the optimum for the material tested and sensitivity was not utilized to its fullest extent. It is not implied that in a brass rod the ultrasonic transmission is attenuated to a level where it is hardly detectable. Rather, just as ultrasonic waves can be made to fade out in a short brass rod by setting the reflectoscope, reverse should be true also.

The second testing method explored was the use of continuously transmitted waves, using two crystals. Results obtained did not materially differ from those of the pulse echo technique, and since the latter method is simpler to conduct, it was utilized for all of the tests, unless stated otherwise.

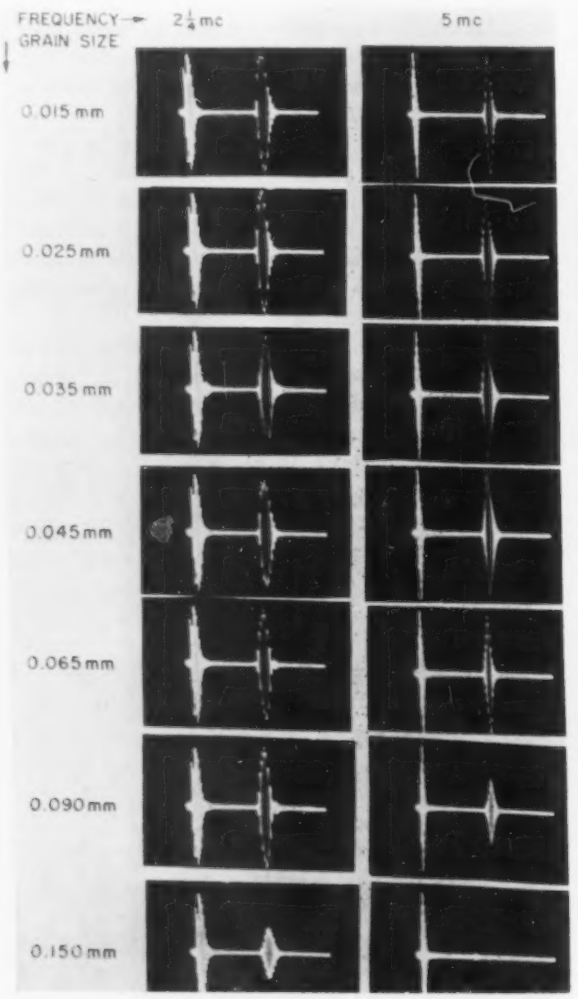


FIG. 1—First back reflection diminishes in height as the grain size increases.

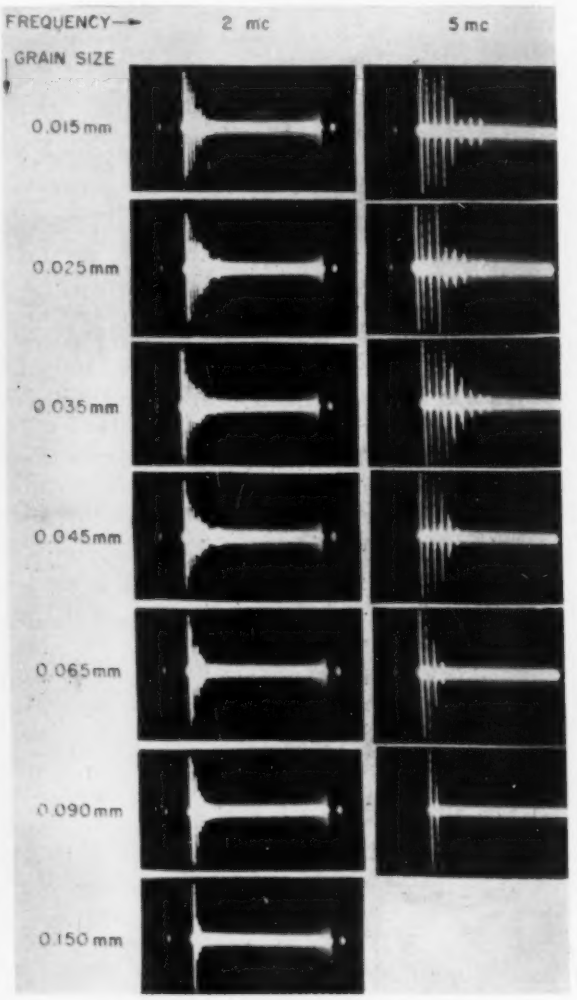


FIG. 2—The number of back reflections is reduced as the grain size is increased.

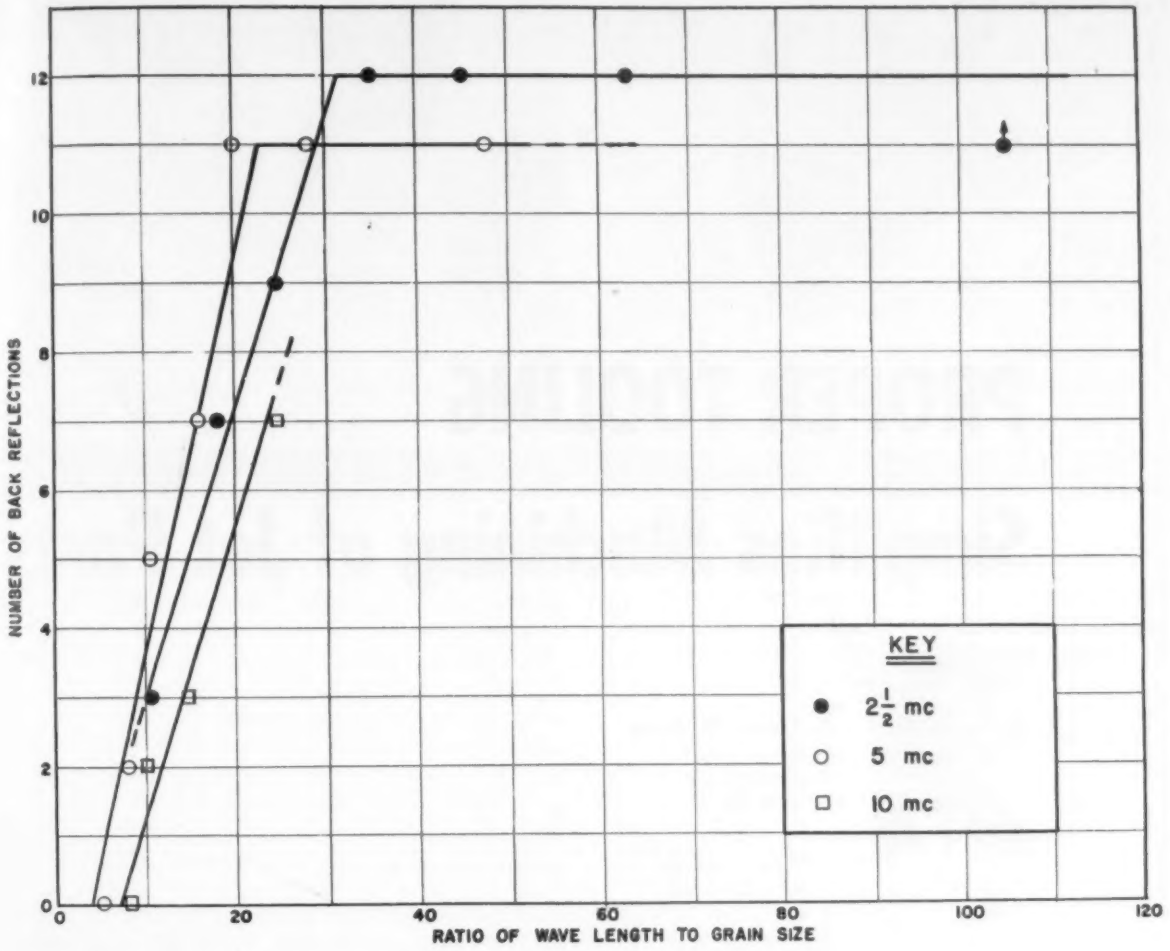


FIG. 3—The number of back reflections compared with wave length to grain size ratio.

The third testing method made use of the number of back reflections for a given setting of the reflectoscope. The results of the tests are listed in Table III.

Decay rate not significant

Representative reflectograms are shown in Fig. 2. Results obtained by the multiple reflection method appeared more reproducible and less sensitive to test conditions than the other methods and was used to obtain a semi-quantitative evaluation of these tests. Fig. 3 shows a plot of the number of back-reflections vs the ratio of the wave length to the grain size. The number of the back-reflections was determined from the various reflectograms; the velocity of sound in brass was taken as 11,480 feet per second, and the grain sizes were as listed in Table I. This graphical plot confirms the previous results: decrease of transmissibility takes place abruptly as the ratio of wave length to grain size approaches some critical value.

The transmissibility as measured by the number of back reflections is essentially constant for wave length to grain size ratios over 30 to 1. The reduction of transmissibility is quite rapid when the wave length to grain size ratio is reduced below that value. The rate of decay, as indicated by the slopes of these portions of the curves is a complex function of several factors, and no conclusion can be drawn as to their significance on the basis of these tests alone.

The compressed specimen, which had internal residual stresses due to a 10 pct axial plastic deformation, exhibited the same ultrasonic properties as the specimen with the same grain size, but no axial compression. This indicates that the ultrasonic transmissibility effects may be attributed to variation in grain size, and not some factor, such as the level of stress relief occurring during the heat treating cycle. This does not imply, however, that residual stresses might not affect the ultrasonic transmissibility; it merely states that with the current experimental techniques employed, such a contributing factor—if it existed—could not be detected and identified.

For longer life—

PROPER TOOLING

Simplifies Machining of Jet Parts

By Dennis G. Jones
Project Engineer
Kennametal, Inc.
Latrobe, Pa.

◆ Wide use of high temperature, stainless and titanium alloys for jet engine parts has raised new demands for improved tooling . . . Carbide tool makers have met these requirements with new tooling materials and improved machining methods.

◆ More production at lower cost can be obtained from carbides by selecting the right tooling for the job at hand . . . Close attention to cutting speeds and feeds is more important than ever . . . Titanium is best machined with edge wear resistant grades.

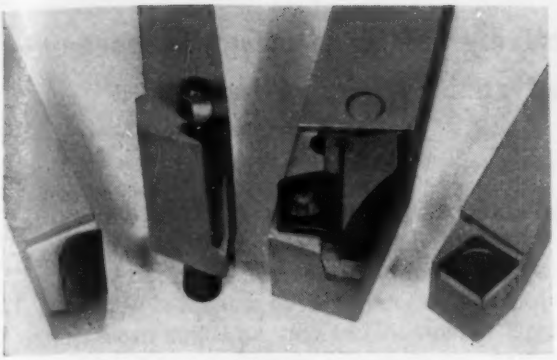
◆ Proper coolant and proper coolant flow, directed as needed for specific material and tooling problems will aid substantially in increasing carbide tool life.

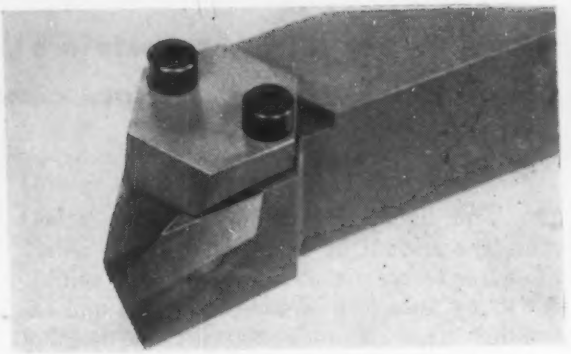
◆ MATERIALS USED IN JET engines have posed many new machining problems for industry. Wide use of stainless and high temperature alloys and of titanium alloys has made necessary the development of tool designs and machining methods especially suited to machining of these materials.

Major metal cutting problems are concerned with machining the details for the compressor and turbine sections. These sections, ranging from the "cold" to "hot" parts of the engine, use a variety of materials, including both normal and high temperature alloys. Components of the other sections vary only in size and shape in most cases. It is important to recognize the alloys used in jet engines as special materials requiring special machining techniques. Identification of the jet materials and understanding the methods for machining them are important. Table I lists some machined components and materials from which they are made.

The steels can be separated into three general classes, chromium, nickel, and chromium-nickel alloys. Other jet alloys contain little, if any, iron and must be considered separately as far as cutting properties are concerned.

The stainless steels fall into two groups: (1) The austenitic, chromium-nickel type, AISI 300 series. (2) The ferritic or martensitic, chromium types, AISI 400 series. Identification of these stainless steels is critical since the AISI 300 series are machined most efficiently with tungsten carbide or edge-wear resistant





FOUR STANDARD Kennametal tools, above left. Conventional brazed type, solid insert type, the H-tool or clamped on type, and the screwed on or insert type cutting tool. Profiling tool, above, is adaptable to T-lathe tracer operations, tracer type boring mills or lathes.

grades of Kennametal whereas the AISI 400 series is best machined with tungsten-titanium carbide or crater-resistant (steel cutting) grades. A simple method for quickly identifying the two types of stainless steels is to test the material for magnetism with the aid of a small permanent magnet. The AISI 400 series is strongly magnetic whereas the AISI 300 series is practically nonmagnetic.

Materials such as Discaloy, Inconel, Inconel X, Ductaloy, Tinidur and S-816 contain higher percentages of nickel, chromium or cobalt. Frequently alloys of this type contain small amounts of titanium or molybdenum. The machinability rating of these materials is equal to or lower than that of the austenitic stainless steels.

Titanium is best machined with edge-wear resistant grades. The surface speed will depend on the condition of the material. The average commercial titanium alloys can be rough machined at 75 to 150 sfpm and finished at 130 to 250 sfpm. Some severe roughing operations on extruded bars or scaley castings will require speeds less than 75 sfpm to obtain satisfactory tool life and performance.

Feeds of 0.012 in. per revolution or more are desirable. The heavier feeds will reduce the effect of abrasion, chief source of tool wear when machining titanium. With a rigid setup and sturdy tools, feeds of 0.030 to 0.060 in. are possible.

Because of the seizing or galling characteristics of titanium, it is important that tool geometry allow free chip flow. To permit this free chip flow, the tool must have positive side rakes. For maximum strength at cutting edge, back rakes should be neutral or negative. As the severity of the cutting operation increases the back rake can be made negative up to 5°. As the degree of negative back rake is increased, the lead angle should also be increased. A satisfactory tool design for severe roughing would have 6° positive side rake, 5° negative back rake and a 30° lead angle. Industry standard clearances, nose radii and end cutting edge angles are applicable. If edge chipping is encountered, a 2° negative land, 1 to 1½ times the feed up to 1/32 in. maximum width, will help retard this failure.

Use of coolants is complicated by the problem of chip contamination. Clean titanium chips can be used as melting stock. If they are contaminated they must then be completely reprocessed.

Water has been used as a coolant but is undesirable because of rusting. However, for continuous operation, use of water is not advisable. If great amounts of stock are to be removed on continuous operations, it is more economical to operate at slower speeds and feeds and sacrifice tool life than to use water.

TABLE I

JET ENGINE MATERIALS

	Materials
Compressor Disks	AISI 410 Stainless Steel Titanium
Turbine Disks	Timken 16-25-6 Discaloy
Compressor Shafts Turbine Shafts	AISI 410 Stainless Steel SAE 4340 Steel Discaloy
Shroud Rings	AISI 316 Stainless Steel AISI 321 Stainless Steel AISI 347 Stainless Steel

TABLE II

CARBIDES AND CUTTING SPEEDS

Material	Machining Operation	Carbide Grade	Cutting Speed in sfpm
AISI 300 series (Austenitic) Stainless Steel	Heavy roughing	K1** or K2S*	100 to 180
	General purpose	K6**	120 to 400
	Light finishing	K8**	350 to 800
AISI 400 series (Martensitic and Ferritic) Stainless Steel	Roughing	K2S*	100 to 250
	Finishing	K4H*	200 to 600
Inconel	General purpose	K2S*	80 to 120
Inconel X	Roughing	K2S*	40 to 80
	Finishing	K6**	80 to 120
Discaloy and Tinidur	Roughing	K6**	100 to 150
	Finishing	K8**	120 to 200
Timken 16-25-6	Roughing	K4H*	100 to 200
	Finishing	K4H*	150 to 300
SAE 4340	Roughing	K4H*	150 to 300
	Finishing	K5H*	250 to 400
Ductaloy	Roughing	K6**	200 to 300
	Finishing	K8**	250 to 350
Titanium Alloys	Roughing	K6**	75 to 150
	Finishing	K8**	125 to 200

* Crater resistant grades.
** Edge wear resistant grades.

"Many jet components are effectively machined using the geometry provided with standard cemented carbide brazed tools . . ."

In semi-finishing or finishing operations where the amount of chips recovered is small, it is wiser to use a natural or synthetic soluble oil cutting fluid to increase production and extend tool life. This production increase and tool savings will in most cases offset the loss sustained through chip contamination by coolants.

Experimental work with carbon dioxide vapor as a "cutting fluid" has improved tool life and permitted higher operating speeds. However, CO_2 is not recoverable and may prove to be expensive compared to the savings expected.

Alloys used in jet engines appear to have machining characteristics similar to ordinary carbon steel. For this reason some of the initial attempts to machine them were made with steel cutting grades of cemented carbide. It was soon discovered that for many of these materials the cast iron cutting grades provided longer tool life. This stems from the unusual abrasiveness and work hardening properties of these materials and the fact that the cast iron cutting grades provide particularly good edge-wear resistance.

Tool pressure distorts fragile parts

There are borderline materials for which the selection of the proper type of cutting material will depend on the conditions of the material, the form in which it is supplied and the manner in which it is to be machined. These are special cases and should be investigated thoroughly before permanent tooling is established.

Many jet components are most efficiently machined using the geometry provided with standard cemented carbide brazed tools. However, these tools can be readily made or ground to provide whatever tool angles are needed. They are particularly useful and economical in developing the optimum tool geometry for a job, from which mechanically-held tools can then be designed.

Mechanically-held, indexable insert type tools with 7° negative side and back rakes are economical where they can be applied. They cause slightly more tool pressure than comparable style standard brazed tools and require more rigid fixtures and workpieces. Tools with negative rakes also require additional machine tool horsepower.

Frequently parts encountered in jet machining are fragile. A diameter of 30 in. or more may be accompanied by a complex cross-section as thin as 1/16 in. in some places. Parts of this type cannot provide the necessary rigidity for negative rake tooling and require well designed supporting and holding devices. Under best conditions such parts will distort when tool pressure against the work is excessive.

A triangular style tool may be used on roughing and finishing of a turbine shroud ring. Previously this job had been machined with brazed tools. Frequent changes and tool breakage resulted in excessive downtime and tool cost. Use of Kennamatic triangular tooling made it possible to change cutting edges quickly and easily without losing size. Downtime was virtually eliminated. Breakage no longer occurred. The number of pieces per cutting edge was increased.

For heavier roughing operations the H-type or clamped-on insert type tools are recommended. These provide a negative back rake in combination with positive side rake. Such a combination produces a shear effect highly efficient for general purpose work. The insert can be quickly changed when dull without disturbing the holder. These tools are adaptable to limited modification to obtain desired results.

A special Kendex tool with small size inserts which can be considered expendable inasmuch as they provide multiple cutting edges for a low initial cost was developed for jet engine machining. Many components are finished all over. Turning, facing, boring, and chamfering tools are required. This special tool utilizes parts of the cutting edge which in conventional tooling are unused, thereby adding to its efficiency.

The contouring or profiling tool is adaptable to conventional type tracer lathes or boring mills and particularly T-lathes. The "V" seat provides positive resistance against lateral thrust in any direction. In contour turning or facing forces exerted upon the cutting tool change with every change in cutting conditions, due primarily to the change in direction of feed. If the machine does not compensate for the changing diameter, the increasing or decreasing surface speed will also affect cutting conditions.

Rates can be changed where needed

To prevent movement of the carbide insert, the tool must be designed to resist forces from all directions. The triangular PT insert when firmly clamped in the matching V shaped seat becomes an almost integral part of the tool. Movement from side thrust in either direction is virtually impossible. The two-screw clamp prevents any tilting or lifting of the insert and the back-up screw resists any axial movement.

Adding to the effectiveness of the PT tool is its adaptability to jobs requiring changes in tool geometry. The included angle can be increased or decreased as needed. Clearance can be modified if necessary. While rakes provided

WHAT TYPE CARBIDE TOOL IS BEST?

Screwed on insert type tools

1. For light roughing and finishing cuts.
2. Where a single tool is required to perform multiple operations.
3. Where grinding facilities are not available or are expensive.
4. Where a low cost, mechanically-held, indexable tool is desired.

Indexable insert type tools

1. Where tool and work fixtures provide necessary rigidity.
2. Where the workpiece has in itself at least moderate rigidity.
3. Where the part material is particularly abrasive and the number of pieces machined per cutting edge is low.
4. Where lowest tool maintenance cost is desired.

Clamped-on insert type tools

1. Where the workpiece is a rough forging or casting especially those necessitating heavy cuts.
2. Where tool and work fixtures provide maximum rigidity.
3. Where rapid wear requires frequent tool changes.
4. Where tool angles must be altered slightly and still provide maximum strength.

Brazed Tools

1. For general applications.
2. Where extreme tool angles are required.
3. For preliminary tooling preparatory to specifying permanent tooling.
4. For lowest initial cost.

Profiling tools

1. For tracer or profiling operations.
2. Where maximum strength and adaptability is required.
3. Where modified "plunging" angles are needed.
4. Where a quick-change insert is desired.

with the standard tools are usually satisfactory, if specific conditions require, they may be easily changed.

The box, see above, offers a guide in determining which tool is applicable for different machining conditions. Many forms of special tools can be designed for selected uses. These are frequently modifications of standard brazed or mechanical tools incorporating multiple inserts, dimensional controls, form cutting shapes and indexability. If these tools are the mechanical type, standard inserts and tool components are used where possible to lower initial and maintenance costs.

Improper speeds shorten tool life

Most items must be machined in one or more ways. To do this efficiently it is necessary to remove maximum material in least time at lowest time-unit cost. While machining at highest speeds and heaviest feeds might appear most economical, considered by time-unit cost such methods may be extremely expensive. Tool life will almost certainly be shortened by operating at inefficient speeds and feeds. Tool and grinding costs, downtime, tool breakage, scrap, and part cost will ultimately be increased. Speeds and feeds should be selected to provide optimum operating conditions.

Because of the work-hardening and abrasive characteristics of many jet engine materials, the following rules are applicable:

1. When the material shows work-hardening characteristics, keep the chip load above 0.012 in. if possible. If the material work-hardens severely, best approach is to increase feeds and lower surface foot rate.

2. Effect of abrasion is measured by tool wear. As with any abrasive process, such as grinding, as less abrasive surface passes the cutting edge, tool life is longer. For maximum tool life, remove the greatest number of cubic inches of metal per surface foot passing the cutting edge. This can only be obtained through maximum feed and depth of cut at the lowest practical surface foot rate.

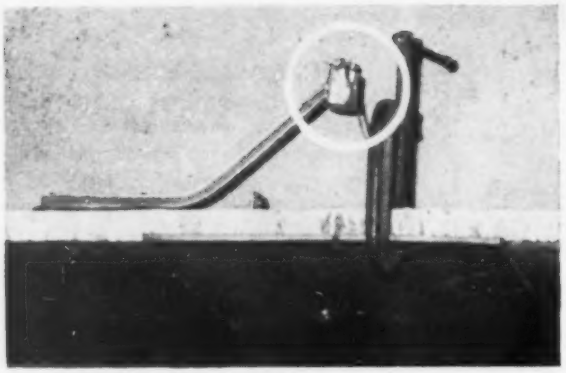
Listed in Table II are speed ranges and Kennametal grade recommendations for various materials. Feeds for these materials should be kept above 0.012 in. per revolution except for finish cuts. When finishing, take the maximum feed at which the necessary finish can be produced.

Paralleling development of jet alloy machining techniques have been advances made in the field of cutting fluids. These new fluids provide increased wetting action, better thermal characteristics and require less maintenance. The synthetic base, along with the conventional type soluble oils are very effective in machining the jet alloys, particularly the AISI 300 and 400 stainless steels.

Carbides will not withstand the severe thermal shock caused by uneven or intermittent coolant application. Cracks develop in the tip or insert and cause tool failure, sometimes damaging tool holder or workpiece.

Conventional method of application is to direct a stream of fluid from above and behind the tool. If the flow is abundant and the cut not too deep, this method is satisfactory. However, if the cut is heavy causing a broad chip which covers most of the tip or insert, the cutting fluid will only be at the point of the tool intermittently. To avoid this condition it is advisable to change the direction of the stream so that the fluid can get to the point of the tool.

One of the most effective ways of doing this is to apply the fluid from beneath the tool so that it gets to the cutting edge through the included angle formed by the workpiece and the side and end clearances of the tool.



FABRICATED 1½-in. thick I-beam has film clamped on one side, Cobalt 60 source is mounted opposite to check weld soundness.

COBALT 60

By D. E. Brewer*
Thomas & Brewer
Detroit, Mich.

◆ POWERFUL, portable and comparatively inexpensive radiography techniques have become available to smaller metal fabricating plants and foundries with the advent of Cobalt 60, irradiated in the giant reactors at Oak Ridge, Tenn., and Chalk River, Ont. Cobalt 60 inspection is being used to detect flaws in castings and weldments subject to severe stresses, to locate hidden elements in internal assemblies, and to uncover internal holes and voids.

The advantages of Cobalt 60 as a radiation source are: (1) low initial cost; (2) complete portability with no need for heavy-duty electrical service connections; (3) its more penetrating rays permit inspection of much heavier work than is practical with all but the most powerful x-ray installations.

Little accessory equipment is needed to use Cobalt 60 effectively. A 500 millicurie source in the form of an encapsulated pellet can be safely stored and shipped in a 400-lb cast iron container. At the inspection site the source is removed from the container with a remote handling probe so that it can be lowered into pressure vessels, placed behind fabricated structures, or spotted in a variety of tight corners where an x-ray machine could not be used.

*Formerly Sales Mgr., Radioactive Products, Inc.

Ship building has become a key application for Cobalt 60 inspection, and a Detroit service organization, X-Ray, Inc., has had unusual results with it. Under strict supervision of Underwriters and ASME codes, the firm has been radiographing all stressed welds in many Great Lakes shipyards.

Welded bulkheads, sides, seams and deck plating are inspected on a statistical sample basis. In doing this, film is placed upon one side of the plate to be inspected. The Cobalt 60 source is then removed from its container and attached by magnetic or other means to the other side. Since some jobs are performed after ship launching, the source is attached to a float so it will not be lost in case it is accidentally dropped in the water. If a defective weld is found, inspection is switched from sample coverage to 100 pct coverage in the indicated areas.

Typical also of these on-the-spot inspections of structural shapes was a recent Cobalt 60 check of 1½-in. I-beams being installed in a new Music Hall addition at the University of Illinois. Cobalt 60 inspection showed defective welds on one of the beams, hence a possibility of its failing under load. Because of the rush aspects of the contract, technicians were flown from Detroit to Urbana, Ill., to perform a complete inspection. Cobalt 60 enabled quick study and immediate correction of these weld defects

◆ Cobalt 60 radiography techniques are being used by more firms to inspect welds, castings and internal assemblies . . . This gamma ray source comes from AEC reactors, is powerful, portable and cheap . . . Small pellets can get into tight spots inaccessible to bulky x-ray machines . . . Key applications are pressure vessels, critical castings, ship and structural welds.

◆ You can buy a complete Cobalt 60 inspection kit for less than $800 and send your competent personnel to training school . . . Or call in a service firm to handle the hot stuff for you . . . Don't plan to use it on small parts or sections less than 1/2 in. thick—it's better for heavy work . . . Economical for intermittent or 100 pct inspection.

Inspection Uses Are Growing

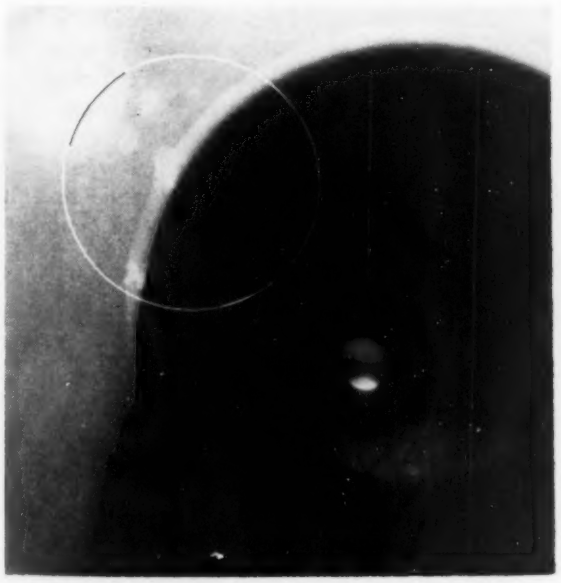
which would not have been possible by other radiography methods.

Pressure vessels and allied piping are other naturals for Cobalt 60 inspection. Newer high pressure power houses use piping with ½- to 3-in. walls, as well as surge tanks, air tanks, and boilers, all of which must be carefully checked. This is particularly true of elbows and bends which need added structural protection against high steam velocities.

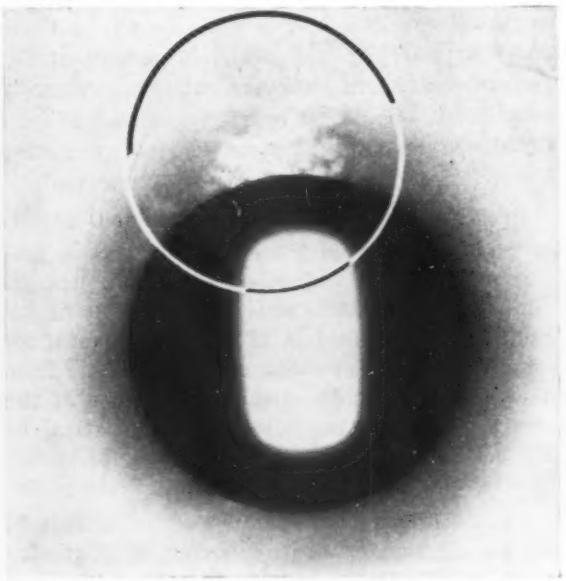
Refineries, cat crackers, retort tubes, heat exchangers, etc., present similar pressure vessel safety problems which can be readily examined with Cobalt 60. The source is usually taped with an adhesive to the inner surface of these vessels and the film clamped to the outer surface. Statistical inspection is given the entire installation, with 100 pct inspection to particularly high stress areas.

In hydro-electric plants, the tunnels and penstocks (feeders) are also checked with Cobalt 60. Valves, rotors and high pressure pumps going into such installations are checked also, either at the foundry or the construction site.

Another high pressure safety examination with Cobalt 60 relates to die casting machinery. In this type of equipment, high pressures ranging from 1000 psi to 3000 psi are employed to inject molten metal into the die. The injection nozzle is the critical part for inspection; if it is defective, it could easily be destroyed during the injection cycle. This might mean a blow-out,



LARGE HOUSING, radiographed by sections, revealed shrinkage, porosity and cracks.



100 PCT inspection of many bronze pressure plates shows heavy shrinkage in one unit.

"In diversified foundry usage Cobalt 60 inspection stands out because of its low cost . . ."

endangering personnel or gumming up the machinery, causing expensive downtime for cleaning and repair.

For obvious safety reasons, Army and Air Force specifications call for 100 pct radiography inspection on many critical ordnance and aircraft parts. Failure of the most inexpensive component could conceivably cost human lives and the loss of expensive fighting equipment. Because of the thick sections often involved, Cobalt 60 is most practical. The bronze pressure plate casting shown in an accompanying photograph is typical. This casting is inspected prior to machining.

Another interesting Cobalt 60 application occurred recently when several ships at widely remote anchorages broke anchor and were damaged considerably during storms. Maritime inspectors found in each instance that the anchor failure could be traced directly to a 5-in. OD cast steel pin. Such a diameter would normally be adequate to survive the thousands of tons of stress that might exist in a heavy sea. But the pins unaccountably had gas holes 4-in. in diam at the most critical stress points.

Checks casting practices

Cobalt 60 was utilized to inspect all of the faulty anchor pins as well as the companion anchor shackles which weighed several hundred pounds each. All were made by the same supplier. Gross porosity and shrinkage, as well as the large gas holes, were found in these shackles and pins. Further inspection at the foundry uncovered improper gating and risering procedures. These were corrected and 100 pct Cobalt 60 inspection on subsequent production showed that the defects had been eliminated.

In other casting inspections, Cobalt 60 has sometimes indicated a need for changes in pattern dimensions and assembly techniques. In addition to production line inspection of all castings, Cobalt 60 is also extremely useful for inspection of the first few castings coming from new heats or molds. Although end use of the castings may not require either statistical or 100 pct inspection, it is helpful to be fairly certain that each casting will be satisfactory.

In such diversified foundry usage, Cobalt 60 stands out because of its low cost. The foundry can have its film processed inexpensively by a local service organization, rather than maintain its own film lab to check on casting techniques.

Heavy bar stock is not generally thought to require radiographic inspection, but one x-ray service firm, X-Ray, Inc., reports such an instance in a particular lot of 4140 Cr-Mo steel. Complaints from users of finding voids during machining led to the Cobalt 60 inspection. Radiography of several lengths disclosed these voids recurring every four feet. Segregations and small inclusions also appeared at random throughout the lengths. These defects were attributed to hot-shortness resulting from sulfur segregation.

Use requires AEC approval

Acceptance of Cobalt 60 by industry has been steadily increasing. Latest published AEC data shows about 700 Cobalt 60 shipments now being made annually, with approximately 80 pct going to industrial users. Recent price reductions have helped this trend, and a 500-millicurie source can now be obtained for as little as $250.

There are some limitations to the use of Cobalt 60. It is not suitable for examining small mechanical parts or sections less than ⅜ to ½ in. thick. These will not stop enough of the hard gamma radiation to produce intelligible contrast on the film. The material has a half life of 5.3 years and must eventually be replaced. Also, the method is not as fast as x-ray inspection.

Handling problems with Cobalt 60 must also be considered. In 12 min time at one meter distance from a 500-millicurie source, a person will receive a 100-milliroentgen exposure. This is 1/3 the weekly tolerance established by the AEC, so that source handling must be quick and sure. Because of these hazards the AEC must approve all applications for the use of the material, and competent personnel must be in charge of inspection projects.

One manufacturer, Radioactive Products, Inc., is now offering a complete Cobalt 60 handling package for less than $800. This includes a source, a cast iron shipping and storage container, a remote handling probe, survey meter, pocket dosimeter and dosimeter charger. The necessary film, plus processing and reading equipment, can also be obtained from one manufacturer.

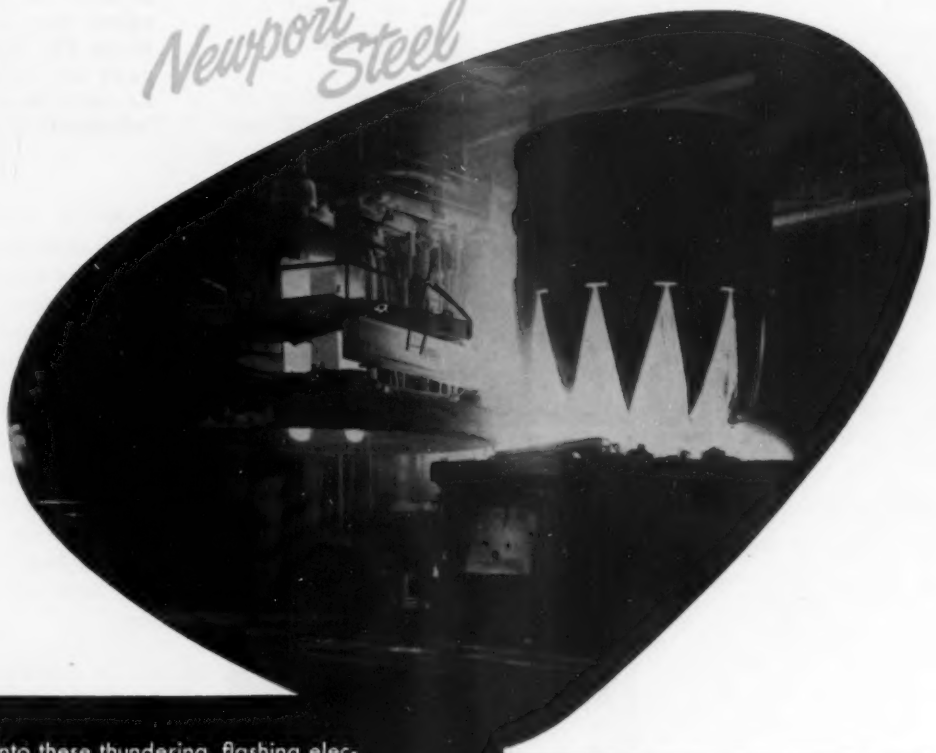
Training programs available

Much reference material on Cobalt 60 and its uses is now available in texts, trade publication articles and in data supplied by the AEC Isotopes Division, Oak Ridge, Tenn. Film and equipment manufacturers, instrument makers and encapsulation firms can also provide helpful information. Cobalt 60 training programs at many colleges, at Oak Ridge, and at the plants of supply and service organizations can educate personnel with a minimum amount of time and cost.

INFERNO BY PRESCRIPTION

AT

Newport Steel



Into these thundering, flashing electric furnaces go charges of scrap and other materials in proportions determined by your steel specifications. Newport's modern facilities and methods and their 68 years' experience in fine steelmaking take it from there. Electric power beats these ingredients into submission, chemicals float out the impurities, laboratories guide melters by frequent samples, and six hours of refining produces a heat which can be processed into exactly what you ordered. Newport continues to spend millions of dollars annually on the modernization and expansion program which makes this an ever better source for the most exacting buyer of steel.

PRODUCTS OF NEWPORT STEEL

- Hot-Rolled Steel in Coil
- Hot-Rolled Pickled Steel in Coil
- Electric Weld Line Pipe
- Hot-Rolled Sheets
- Galvanized Sheets
- Galvannealed Sheets
- Colorbond Sheets
- Hot-Rolled Pickled Sheets
- Electrical Sheets
- Alloy Sheets
- Roofing and Siding
- Eave Trough and Conductor Pipe
- Culverts

ECONOMICAL WATERAIL DELIVERY

Newport Steel is situated on the Mississippi-Ohio River system and the great Cincinnati rail hub. With the advantage of location, new river barge facilities and seven major railroads, Newport gives economical, dependable delivery to industrial areas throughout the Middle West and South.

Newport Steel

CORPORATION

NEWPORT, KENTUCKY

Titanium:

Casting process ready for licensing.

A new method of casting titanium and its alloys using a relatively inexpensive mold is now advanced to the point where it is ready for licensing. The process uses vacuum, inert atmosphere and an arc melting furnace.

Licenses will be granted on a non-exclusive basis by the National Research Corp., Cambridge, Mass., who developed the process. This company feels that the method is commercially feasible and are prepared to furnish equipment and to assist licensees in the development of the process on a commercial scale.

Process Is Simple

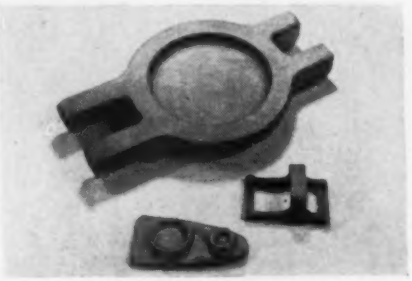
Intricate castings of titanium and its alloys cast by this process have been found to be sound and are equal to good sand castings in surface appearance. The process is simple and requires few steps not usually found in foundries casting stainless and other alloys.

As is customary, the pattern is made based on shrinkage factors of the metal and mold. The mold is made up of a powdered refractory with a liquid binder poured over the pattern. This solidifies on the pattern, forming one half of the mold. The other half is prepared in a similar manner.

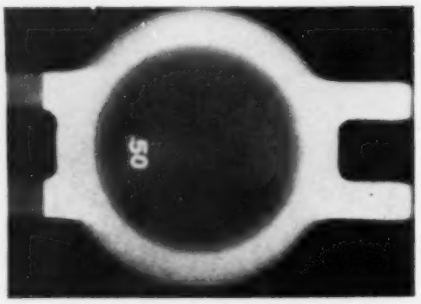
Uses Special Mold Wash

A low-temperature bakeout followed by a high-temperature firing completes the mold. During the above steps the mold is given a special treatment which enables it to withstand the action of molten titanium. The necessary gates, risers, and pour blocks are suitably clamped or jigged and the mold is then placed in the furnace.

Titanium sponge or scrap is loaded into a crucible, and the furnace is sealed from the atmosphere and is evacuated to a pressure of 1-10 mn or 0.001-0.01 mn of mercury. Argon is used to give a suitable atmosphere and pressure for the melting and casting phase of the process.



Castings:
Surface is good . . .



Cover plate:
Structure is sound . . .

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 49. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

When a suitable quantity of metal has been arc melted in the skull type crucible it is poured into the gate of the mold, placed below and directly in line with the pouring lip of the crucible.

Cooled In Furnace

The mold is then cooled under argon or vacuum for one half to one hour, giving the titanium sufficient time to solidify and cool below the temperature at which it reacts with atmospheric contaminants.

PHYSICAL PROPERTIES

	Pure Titanium	4 Pct Cr 2 Pct Mo Alloy
Hardness, RA	60-63	65.5
Charpy impact, ft lb, Room temperature	11	8.4
Tensile strength, psi	Not Available	129,000
Analysis, weight pct		
Oxygen	0.1-0.2	0.3
Nitrogen	0.03	0.03-0.05
Carbon	0.08-0.15	0.1-0.15

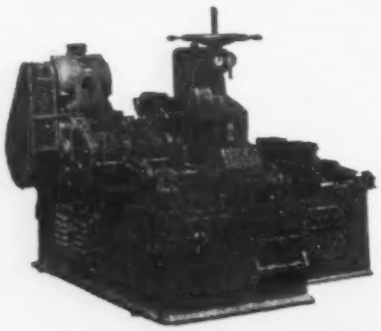
The Equipment Div. of National Research Corp. offers a 10-lb titanium skull-melting arc-type furnace, similar to the one used for the development of this process by NRC. Larger furnaces equipped with three arc electrodes, for titanium castings weighing 25 to 30 lb, can be built.

Research:

New designs get test on 1 million-lb machine.

Testing far rougher than the steady pounding that comes in daily service is in store for railroad car trucks and other components at the new $1 million Technical Center of National Malleable & Steel Castings Co., Cleveland.

Big unit in the testing center



RUSSELL
Cold Sawing MACHINES
• FULLY AUTOMATIC HYDRAULIC
Capacities: 3½" to 9½" rounds
• SEMI-AUTOMATIC
Capacities up to 13½" rounds
ASK FOR FREE GENERAL BULLETIN EG-3
TRIPLEX MACHINE TOOL CORP.
75 West Street New York 6, N. Y.

will be a new Baldwin-Lima-Hamilton Corp. testing machine of 1 million lb capacity with one of the largest clearances between columns ever built in a machine of this capacity.

Its 10-ft clearance between columns, maximum vertical opening of 19 ft, and 60-ft base structure indicate the possible size of structures that can be subjected to test loads.

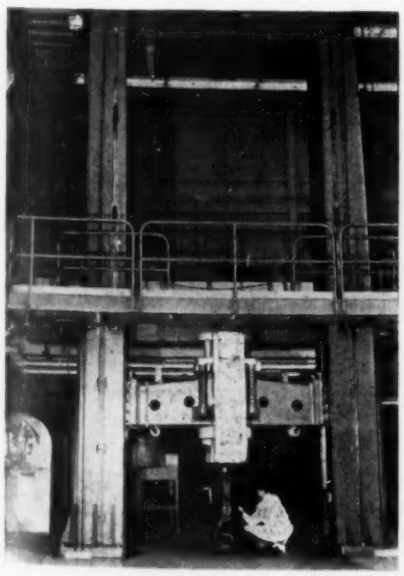
New Designs Tested

The new machine is used to conduct design tests of railroad car truck side frames and bolsters, design tests of couplers, yokes, draft gears, journal boxes, as well as any other parts or devices made by the company.

In the illustration a dynamometer coupler is calibrated in compression. The coupler incorporates a section in which there are 20 load-sensitive SR-4 resistance wire strain gages.

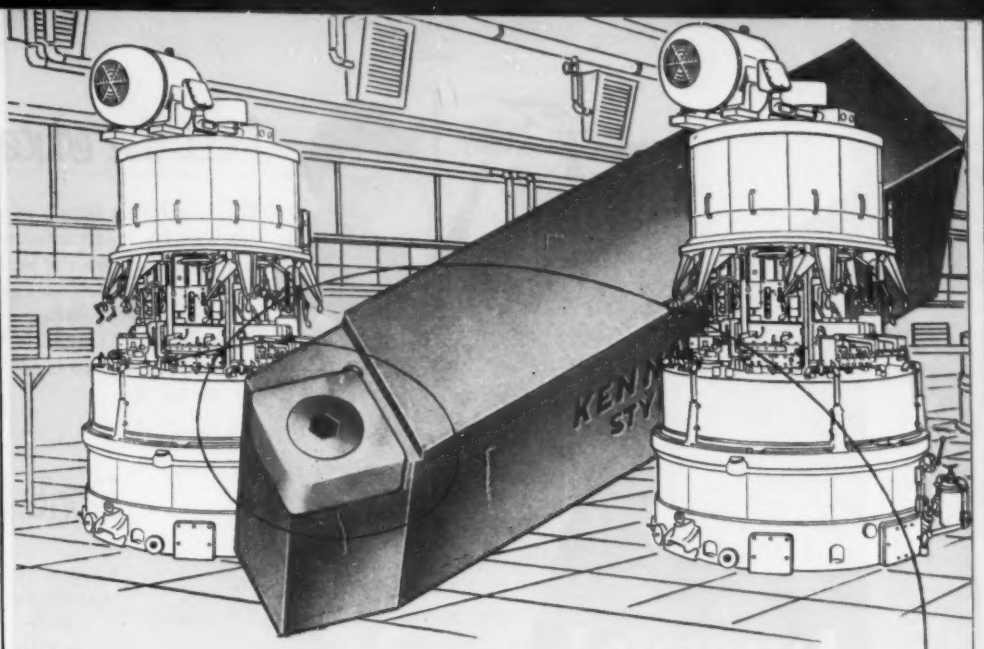
Gage Sill Forces

These gages are used to measure the sill forces on the trucks during impacts of freight cars. The calibration circuit includes all of the cable used in these impact tests on the test track outside the building.



For testing:

Tall and ··lenty wide . . .



The Most Critical Point in AUTOMATION

Machine shop automation—the new trend toward automatic conveying, loading, cutting, unloading, and transferring of workpieces—promises great gains in productivity, but it must have cutting tools designed for the operation.

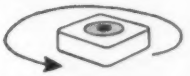
Two features are essential in cutting tools for automation: (1)Durability which enables operation to be sustained with minimum stoppage for tool changing, and, (2)precision-ground, pre-set, multiple-edge tools which permit quick changing when necessary.

Kendex "throw-away" inserts —an exclusive Kennametal development—have both features. Made of Kennametal, they have its high hardness and wear-resistant properties for great durability. Screw-mounted, they can be quickly rotated, in seconds, to new cutting positions. No grinding is required—the insert is thrown away after all cutting edges have been used and quickly replaced with a new preground "button" ... round, square, or triangular as required.

Our engineers, in on the ground floor of automation, have cooperated in developing and applying Kendex, Kennamatic,* and other types of Kennametal tooling to its requirements. The features of this tooling may be the solution to reducing machining and tool maintenance costs—on any operation—in your shop. Ask your Kennametal tool engineer how you may apply it to advantage. Kennametal Inc., Latrobe, Pa.

KENDEX* tooling keeps AUTOMATION *IN ACTION!*

1. Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.



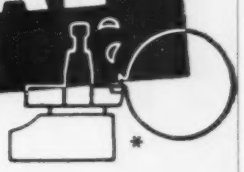
2. Kendex inserts are mounted to suitable holder with socket head screws. When edge becomes dull, insert can be turned, in seconds, to new cutting position.

- *MINIMIZE* downtime for tool changing—a major cause of unprofitable operation.
- *ELIMINATE* tool grinding expense—Kendex inserts are not ground; simply thrown away when all cutting edges have been used.

*Registered Trade-Marks

KENNAMETAL*

CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY



A-5

SALES OFFICES IN PRINCIPAL CITIES

ANACONDA METALS AT WORK

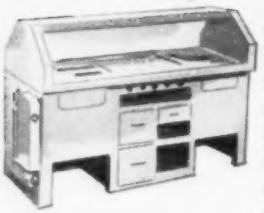
Meet the educated screw

This is a whole family of screws, known as Screwsticks, and joined head-to-toe. Insert a Screwstick in the driver, aim it at the hole—and from there on the Screwstick tightens itself to the predetermined torque, shears itself and gets its head burnished by the following screw which automatically advances itself. It's so fast that American Screw Co. of Willimantic, Conn., which uses ANACONDA Hexagon Brass Rod, refers to it as "jet propulsion".

Don't lose your grip

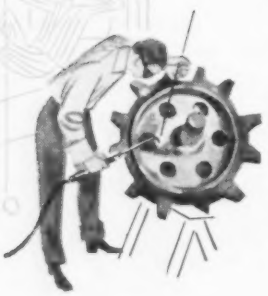
Once a novelty trick developed by the Chinese, the manufacture of these grips is now an industry. Made in a wide variety of styles and sizes by Economy Cable Grip Co. of Norwalk, Conn., they are used to anchor suspended electric power cables and to seize the end for pulling through ducts. The harder you pull, the tighter they grip. Needless to say, the ANACONDA Bronze Cable, Everdur* Rod and Copper Tube used in their manufacture never weaken from rust.

A fast delivery...with mustard



When baseball fans want their hot dogs, they want them fast—so Stainless Alloy Fabricators of Detroit built this "Double-Header" baseball park hot dog server. Its big capacity for hot dogs—and fast service—is its double bun warmer, one at each end, heated by copper water boilers. If the water runs dry, it's no strike-out. Boilers are made of phosphorized copper sheet with joints formed by fusing the edges with a Heliarc torch. No solder used, no seams to burn open.

How to treat a fracture



A fracture often means long uselessness—but that needn't be true of machinery. Usually braze welding can make it good as new and at a fraction of the time and cost of replacing it. This fractured cast iron conveyor drive sprocket, for example, would have taken two months to replace. The Universal Welding Co., Rochester, N. Y., repaired it in only 7 hours by braze-welding with ANACONDA-997 (Low Fuming) Bronze Welding Rod. Moral: don't count the patient out before consulting your welder.

There's more to this than meets the eye

In our Technical Department you will find a range of experience that covers the entire field of copper and copper-alloy applications in the metalworking industries. If you have a problem of metal selection, we are at your service. *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.*

*Reg. U. S. Pat. Off. 5881

ANACONDA® the name to remember in COPPER-BRASS-BRONZE

The Iron Age
FOUNDED 1855
Markets and Prices

THE IRON AGE SUMMARY...

- **Steel industry takes a holiday again this week**
- **Operating rate gains slightly after Xmas drop**
- **Free World production outstripped Reds in '53**

Steelmaking operations this week will register only a moderate gain from the week of Christmas, as a seasonal year-end lag continues to dominate the market. Companies are scheduled to operate at 74.0 pct of rated capacity, a gain of 9 points from last week's revised rate. Thus, the industry will have put back to back the two lowest weeks of operations in recent years.

But steel people aren't alarmed. Year end decline in operations is traditional in the industry—except during time of war or emergency. With customer pressure reduced this year, companies are reducing output by banking furnaces instead of paying costly overtime to keep production up.

Operations are expected to gain gradually in January and to continue to improve in February and March. The latter month will probably be tops for the quarter—and perhaps for the next year.

Steel ingot production index, just adopted by American Iron & Steel Institute, stands at 104.1 this week, compared with 89.8 last week. The index a year ago was at 138.4.

Steel production is gaining faster behind the Iron Curtain than it is in the countries of the Free World. But tonnage output of the Free World is still nearly four times as great as total production behind the Iron Curtain.

Combined production of Russia and its satellites was 14 pct greater in 1953 than in 1952. Output in Free World countries was only 10 pct higher in 1953 than in 1952.

But comparison on a tonnage basis shows a different picture. Free World nations produced over 200 million net tons of raw steel in 1953, while total production of the Communist bloc was a little over 54 million tons. This is almost a 4 to 1 advantage.

Steel production in the entire world was 11 pct greater in 1953 than in 1952. Total world output in 1953 was 254.6 million net tons, compared with 229.4 million net tons in 1952.

Well over half of Free World production in 1953 was accounted for by the United States, which made 111.9 million net tons. This was a gain of 18.7 million tons, or 20.1 pct, over 1952 production of 93.2 million tons. Output in 1952 was restricted by a 54-day strike which closed down most of the industry. Operations in 1953 were unhampered by labor or other troubles.

U. S. steel production in 1953 was more than twice as great as that of the entire Soviet bloc which made 54.3 million tons. And U. S. output scored a 20 pct gain in 1953, against a hike of 16 pct by Russia.

Russia dominated steel production behind the Iron Curtain more than the U. S. did output of the Free World. Russian mills accounted for 77.2 pct of steel produced behind the Iron Curtain.

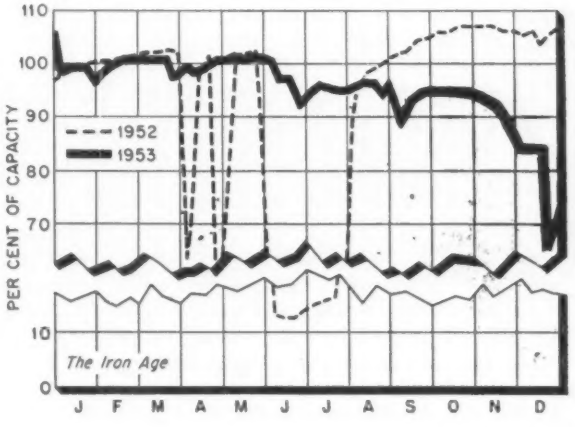
Steelmaking records were a dime a dozen in 1953. World production of 254.6 million tons was a new alltime record, compared with the previous record of 229.4 million tons established in 1952.

In addition, 14 of the 26 steel producing countries listed in THE IRON AGE study established new alltime steel production records in 1953.

Steel Operating Rates

	Week of Dec. 27	Week of Dec. 20		Week of Dec. 27	Week of Dec. 20
Pittsburgh	80.0	89.0	Detroit	82.0	62.0*
Chciago	87.0	74.0	Birmingham	80.5	80.5*
Philadelphia	70.0	72.0*	Wheeling	72.0	76.0*
Valley	58.0	48.0*	S. Ohio River	80.0	80.5
West	79.0	74.0*	St. Louis	83.0	64.0
Cleveland	51.0	45.5	East	67.0	69.0
Buffalo	52.0	52.0	AGGREGATE	74.0	65.0*

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,547,470 net tons.
* Revised



Markets at a Glance

Warehouse Business Lagging . . . Steel warehouse business has slowed markedly in a year-end decline. A number of warehouses have asked mills to hold up on shipments. Inventories on most products are at or above desired levels. Pickup is expected after the first of the year. Stainless steels have already started to move faster at the warehouse level.

Broadens Product Line . . . International Harvester Co. has entered into an agreement with Heil Co. which enables Harvester to manufacture 2-wheel rubber-tired industrial tractors for heavy construction work. In addition Heil will manufacture certain types of scrapers and wagons for Harvester.

Seek OK on Gas Project . . . Texas Eastern Transmission Corp. and its subsidiary Texas Eastern Penn-Jersey Transmission Corp. are seeking Federal Power Commission approval of a project involving a gas storage service for Transcontinental Gas Pipe Line Corp. Program includes construction of 265 miles of 24-in. pipeline from Oakford, Pa., to Lambertville, N. J., to be completed by the fall of 1954.

Steel's Third Best Year . . . Armco Steel Corp. estimates overall steel demand will be close to 100 million tons in 1954. This would be about 12 pct less than demand in '53 but would still be the third best year in the history of the industry.

Nickel Output Soars . . . Free World nickel production in 1953 was estimated at 170,000 tons by International Nickel Co. This is an increase of 10,000 tons over last year. Canadian output accounted for about 85 pct of the total. Production in 1954 is expected to hit 192,500 tons.

Appliance Forecast . . . Admiral Corp. believes more than 5.5 million TV sets will be sold during 1954. Around 10 million radios will be made compared with 12 million this year. Refrigerator production is expected to be about the same as this year's 3.1 million units.

Changes Extras . . . U. S. Steel Corp. has revised extras covering hot-rolled bars, concrete reinforcing bars, pipe skelp and galvanized sheet. In addition mill base prices for silicon steel sheets were changed. The revisions amount to an average increase of 3 pct although prices of certain grades have been reduced, others increased, while some remained the same. Wheeling Steel Corp. has made similar price revisions and other companies are expected to follow shortly.

Set Production Record . . . U. S. Steel Corp. set an alltime record by turning out 37.5 million tons of steel in 1953, operating at an average rate of 98 pct of capacity. During 1954 the company plans to invest approximately $300 million in new and replacement equipment.

Test Catalytic Muffler . . . Private demonstration of a catalytic muffler designed to eliminate one of the major causes of smog—the hydrocarbons in exhaust fumes from autos and trucks—was held in Philadelphia recently. The automobile muffler will be available commercially within 6 to 8 weeks. Inventor Eugene Houdry believes there will be considerable demand for the new muffler from both the general public and the automotive industry.

Gear Index Drops . . . American Gear Manufacturers Assn. index dropped to 144.9 in November, a decline of 31.4 pct from October.

Freight Loadings Increase . . . Assn. of American Railroads reports freight car loadings for the year were slightly above 1952, although in the closing weeks of the year they were running about 10 pct below the pace for the same period last year. This decline is expected to continue through early '54.

Not Enough Nickel . . . Nickel stainless steel continues to be a lively part of the market, while demand for chrome stainless grades has been lagging. One reason is that some users who had been forced to find alternates for nickel during controls are now drifting back. But nickel supplies will not improve fast enough to satisfy all users in the near future.

Scrap Outlook . . . With the Christmas holidays depressing an already dull market, the scrap trade sees little chance of the situation improving before January. Lack of buyer interest has brought scrap movement to a virtual standstill in many steelmaking districts.

Prices At A Glance

(cents per lb unless otherwise noted)

Composite Prices	This Week	Last Week	Last Month	Last Year
Finished Steel, base	4.634	4.634	4.632	4.376
Pig Iron (gross ton)	$56.59	$56.59	$56.59	$55.26
Scrap, No. 1 hvy. (Gross ton)	$30.17	$30.00	$33.83	$42.00
Nonferrous Metals				
Aluminum, ingot	21.50	21.50	21.50	20.00
Copper, electrolytic	29.75	29.75	29.75	24.50
Lead, St. Louis	13.30	13.30	13.30	14.55
Magnesium, ingot	27.00	27.00	27.00	24.50
Nickel, electrolytic	63.08	63.08	63.08	59.58
Tin, Straits, N. Y.	84.00	84.25	82.25	$1.21½
Zinc, E. St. Louis	10.00	10.00	10.00	12.50

Hope for Higher Prices in 1954

Christmas holidays deepen scrap lull . . . Movement at virtual standstill in most districts . . . Trade sees little improvement until January . . . But new order prices may be up.

The Christmas holidays only deepened the scrap market lull. With little material moving in any district, prices were virtually unchanged. But the trade doesn't look for any relief until Jan. 1 at the earliest. Many think prices will stay at present levels through Feb. 1, pick up thereafter. Conversely, some trade sources say they see signs that scrap prices have reached a floor, doubt any further sizable declines.

Partial clarification of a badly confused market picture raised THE IRON AGE Steel Scrap Composite 17¢ over last week's quotation to $30.17, but this increase is much more a statistical refinement than a reflection of a stronger market.

Revised specifications for heavy melting and bundle grades go into effect officially Jan. 1 (THE IRON AGE, Nov. 19, 1953, p. 190). But trade sources believe consumers will continue to allow orders to be filled on the previous basis until Feb. 1 at least. And general feeling is that the changeover will cause little disruption of normal processing procedures.

Pittsburgh—Some scrap consumers are beginning to believe current prices may be an optical illusion. They feel quotations have reached the point where buying of any consequence would quickly reverse the tone of the market. For this reason, there seems to be no great rush to curtail blast furnace production to take advantage of low prices. One astute buyer recently put an enlarged and modernized blast furnace into operation. Openhearth grades remain unchanged this week, but prices of blast furnace, low phos, some railroad grades, and cast dropped.

Chicago—With scrap still dragging its feet, a few optimists were beginning to lay down scrap last week. Scattered reports of an upturn in cast buying were particularly responsible, as well as the feeling that mills could not let the price slip much further before making some purchases. But outlook for steelmaking grades was still not good. The bundle differential between factory and dealer produced had slipped over into heavy melting, with factory No. 1 going $2 higher than yard material. Railroad grades were still reeling. Two purchases of turnings early last week failed to bolster the market generally, though prices were regarded as good.

Philadelphia—With the market at a plodding trading pace, dealers and brokers were waiting for January orders to firm up the pricing picture. Rumors that January would be a "dead buying month" were being circulated. In view of trade pessimism, January could see a continuation of the very slow buying pace. Trade reports of scrap backing up were probably justified. Some quarters fear that some light scrap will rust away before it can be moved.

New York — With industry like everybody else concentrating on the Christmas holidays for most of last week, the scrap market changed scarcely a jot. And practically no one in the trade expects much until after New Year's. But dealers and brokers insist that mill orders of any consequence then will have to be at healthier prices.

Detroit — Prices continued to edge downward on the basis of bidding for industrial lists. Otherwise there was no market activity to speak of and the only buying consisted of what a dealer might pay to lay down scrap in his yard. Market looks bad to most of the trade, although there is some sentiment that prices may be approaching the floor. Downward trend has reached the point where prices may be attractive enough to stimulate some buying.

Cleveland—Holiday lull has taken over. Prices remained unchanged in a very quiet market. Early steel buying by automotive firms and recent bidding on some plant lists has bolstered the market slightly. Blast furnace grades fell off $1 on appraisal here and in the Valley. Consumer apathy is still strong and possibility of price rebound within the next 30 days is dim.

Birmingham—Heavy melting steel scrap and bundles were unchanged in price this week in a very dull market, but price cuts were posted by some mills on structurals and plate and some rails. Cast was softer but prices were unchanged. Some Florida dealers report they have export contracts.

St. Louis—The new designation of No. 2 heavy melting steel at 3 ft and under which becomes effective Jan. 1 is not expected to cause any change in the price of that item. Buying by steel mills was virtually nil during the week and dealers reduced prices in anticipation of lower mill prices after the turn of the year. While not expected to reach the peak years, business in 1954 is predicted to be satisfactory, although the start is likely to be slow.

Cincinnati—Scrap market is quieter than it has been in years. Prices are nominal and unchanged. Outlook for local consumption is not good. Some brokers fear January offerings may dip below $29.

Boston—The sagging New England scrap market dipped to new lows this week and people in trade said it couldn't be worse, but they think it will go lower. No orders at all could be found. Only hope was that mill buyers would become active after the turn of the year.

West Coast—Steelmaking grades of scrap are going begging, but prices remain firm. Cast grades continue to be in good demand as foundries operate at high levels.

Buffalo—Dealers had to pin their hopes for new business on indications that mills were holding back pending turn of a new year. Biggest mill in the area has now been out of the market for more than a month.

Scrap Prices

(Effective Dec. 29, 1953)

Pittsburgh

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	31.00 to 32.00
No. 2 bundles	25.00 to 26.00
Machine shop turn.	16.00 to 17.00
Mixed bor. and ms. turns.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Low phos. punch'gs, plate	33.00 to 34.00
Heavy turnings	27.00 to 28.00
No. 1 RR. hvy. melting	32.00 to 33.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	44.00 to 45.00
RR. steel wheels	35.00 to 36.00
RR. spring steel	35.00 to 36.00
RR. couplers and knuckles	35.00 to 36.00
No. 1 machinery cast.	43.00 to 44.00
Cupola cast.	36.00 to 37.00
Heavy breakable cast.	31.00 to 32.00
Malleable	32.00 to 33.00

Chicago

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 factory bundles	31.00 to 33.00
No. 1 dealers' bundles	28.00 to 29.00
No. 2 dealers' bundles	22.00 to 23.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Low phos. forge crops	36.00 to 37.00
Low phos. punch'gs, plate	32.00 to 34.00
Low phos. 3 ft and under	31.00 to 33.00
No. 1 RR. hvy. melting	32.00 to 34.00
Scrap rails, random lgth.	36.00 to 37.50
Rerolling rails	41.00 to 42.00
Rails 2 ft and under	43.00 to 44.00
Locomotive tires, cut	36.00 to 37.00
Cut bolsters & side frames	36.00 to 37.00
Angles and splice bars	36.00 to 38.00
RR. steel car axles	42.00 to 44.00
RR. couplers and knuckles	35.00 to 37.00
No. 1 machinery cast.	36.00 to 37.00
Cupola cast.	32.00 to 34.00
Heavy breakable cast.	27.00 to 28.00
Cast iron brake shoes	33.00 to 34.00
Cast iron car wheels	32.00 to 34.00
Malleable	38.00 to 40.00
Stove plate	26.00 to 28.00

Philadelphia Area

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	25.00 to 26.00
Machine shop turn.	16.00 to 17.00
Mixed bor. short turn.	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Shoveling, turnings	22.00 to 23.00
Clean cast chem. borings.	24.00 to 25.00
Low phos. 5 ft and under	33.00 to 34.00
Low phos. 2 ft and under	34.00 to 35.00
Low phos. punchings	34.00 to 35.00
Elec. furnace bundles	32.00 to 33.00
Heavy turnings	28.00 to 29.00
RR. steel wheels	36.50 to 37.50
RR. spring steel	36.50 to 37.50
Rails 18 in. and under	42.00 to 43.00
Cupola cast.	34.00 to 35.00
Heavy breakable cast.	37.50 to 38.50
Cast iron carwheels	40.00 to 41.00
Malleable	42.00 to 43.00
Unstripped motor blocks.	27.00 to 28.00
No. 1 machinery cast.	40.00 to 41.00
Charging box cast.	35.00 to 36.00

Cleveland

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	19.00 to 20.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	19.00 to 20.00
Low phos. 2 ft and under	31.00 to 32.00
Drop forge flashings	29.00 to 30.00
No. 1 RR. heavy melting	32.00 to 33.00
Rails 3 ft and under	43.00 to 44.00
Rails 18 in. and under	45.00 to 46.00
Railroad grate bars	29.00 to 30.00
Steel axle turnings	26.00 to 27.00
Railroad cast.	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
Stove plate	35.00 to 36.00
Malleable	42.00 to 43.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 bundles	31.00 to 32.00
No. 2 bundles	26.00 to 27.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Low phos. plate	33.00 to 34.00

Buffalo

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	24.50 to 25.50
No. 1 busheling	28.00 to 29.00
No. 1 bundles	28.00 to 29.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	16.50 to 17.50
Mixed bor. and turn.	18.50 to 19.50
Shoveling turnings	19.50 to 20.50
Cast iron borings	18.50 to 19.50
Low phos. plate	32.00 to 33.00
Scrap rails, random lgth.	34.00 to 35.00
Rails 2 ft and under	39.00 to 40.00
RR. steel wheels	37.00 to 38.00
RR. spring steel	37.00 to 38.00
RR. couplers and knuckles	37.00 to 38.00
No. 1 machinery cast.	37.00 to 38.00
No. 1 cupola cast.	32.00 to 33.00

Detroit

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	18.00 to 19.00
No. 1 bundles, openhearth	22.00 to 23.00
No. 2 bundles	17.00 to 18.00
New busheling	21.00 to 22.00
Drop forge flashings	21.00 to 22.00
Machine shop turn.	9.50 to 10.50
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	22.00 to 23.00
Low phos. punch'gs, plate	21.50 to 22.50
No. 1 cupola cast.	34.00
Heavy breakable cast.	24.00
Stove plate	28.00
Automotive cast.	36.00

St. Louis

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	27.00 to 28.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	10.00 to 11.00
Cast iron borings	12.00 to 13.00
Shoveling turnings	12.00 to 13.00
No. 1 RR. hvy. melting	30.00 to 31.00
Rails, random lengths	35.00 to 36.00
Rails, 18 in. and under	42.00 to 43.00
Locomotive tires, uncut	32.00 to 33.00
Angles and splice bars	32.00 to 33.00
Std. steel car axles	35.00 to 36.00
RR. spring steel	32.00 to 33.00
Cupola cast.	38.00 to 39.00
Hvy. breakable cast.	27.00 to 28.00
Cast iron brake shoes	36.00 to 37.00
Stove plate	28.00 to 29.00
Cast iron car wheels	30.00 to 31.00
Malleable	37.00 to 39.00
Unstripped motor blocks.	27.00 to 28.00

New York

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	19.00 to 20.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	12.00 to 13.00
Clean cast chem. borings.	18.00 to 19.00
No. 1 machinery cast.	35.00 to 36.00
Mixed yard cast.	29.00 to 30.00
Charging box cast.	29.00 to 30.00
Heavy breakable cast.	29.00 to 30.00
Unstripped motor blocks	22.00 to 23.00

Birmingham

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	23.00 to 24.00
No. 1 bundles	25.00 to 26.00
No. 2 bundles	21.00 to 23.00
No. 1 busheling	25.00 to 26.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.50 to 20.50
Cast iron borings	18.50 to 19.50
Electric furnace bundles	28.00 to 28.50
Bar crops and plate	33.00 to 34.00
Structural and plate, 2 ft.	33.00 to 34.00
No. 1 RR. hvy. melting	30.00 to 30.50
Scrap rails, random lgth.	32.00 to 33.00
Rails, 18 in. and under	38.00 to 39.00
Angles & splice bars	35.00 to 36.00
Std. steel axles	35.00 to 36.00
No. 1 cupola cast.	41.00 to 42.00
Stove plate	38.00 to 39.00
Cast iron car wheels	34.00 to 35.00
Charging box cast.	24.00 to 25.00
Heavy breakable	25.00 to 26.00
Unstripped motor blocks	32.00 to 33.00
Mashed tin cans	15.00 to 16.00

Boston

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$22.00
No. 2 hvy. melting	$16.00 to 17.00
No. 1 bundles	22.00
No. 2 bundles	14.00 to 15.00
No. 1 busheling	18.00 to 19.00
Elec. furnace, 3 ft & under	23.00 to 24.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and short turn.	7.00 to 8.00
Shoveling turnings	8.00 to 9.00
Clean cast chem. borings	13.00 to 14.00
No. 1 machinery cast.	29.00 to 31.00
Mixed cupola cast.	24.00 to 25.00
Heavy breakable cast.	26.00 to 26.50
Stove plate	22.50 to 23.50
Unstripped motor blocks	15.00 to 16.00

Cincinnati

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	28.00 to 29.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Low phos. 18 in. & under	37.00 to 38.00
Rails, random lengths	36.00 to 37.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	36.00 to 37.00
Hvy. breakable cast.	33.00 to 34.00
Drop broken cast.	44.00 to 45.00

San Francisco

No. 1 hvy. melting	$23.00
No. 2 hvy. melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
No. 3 bundles	15.00
Machine shop turn.	7.00
Cast iron borings	11.00
No. 1 RR, hvy. melting	23.00
No. 1 cupola cast.	$39.00 to 40.00

Los Angeles

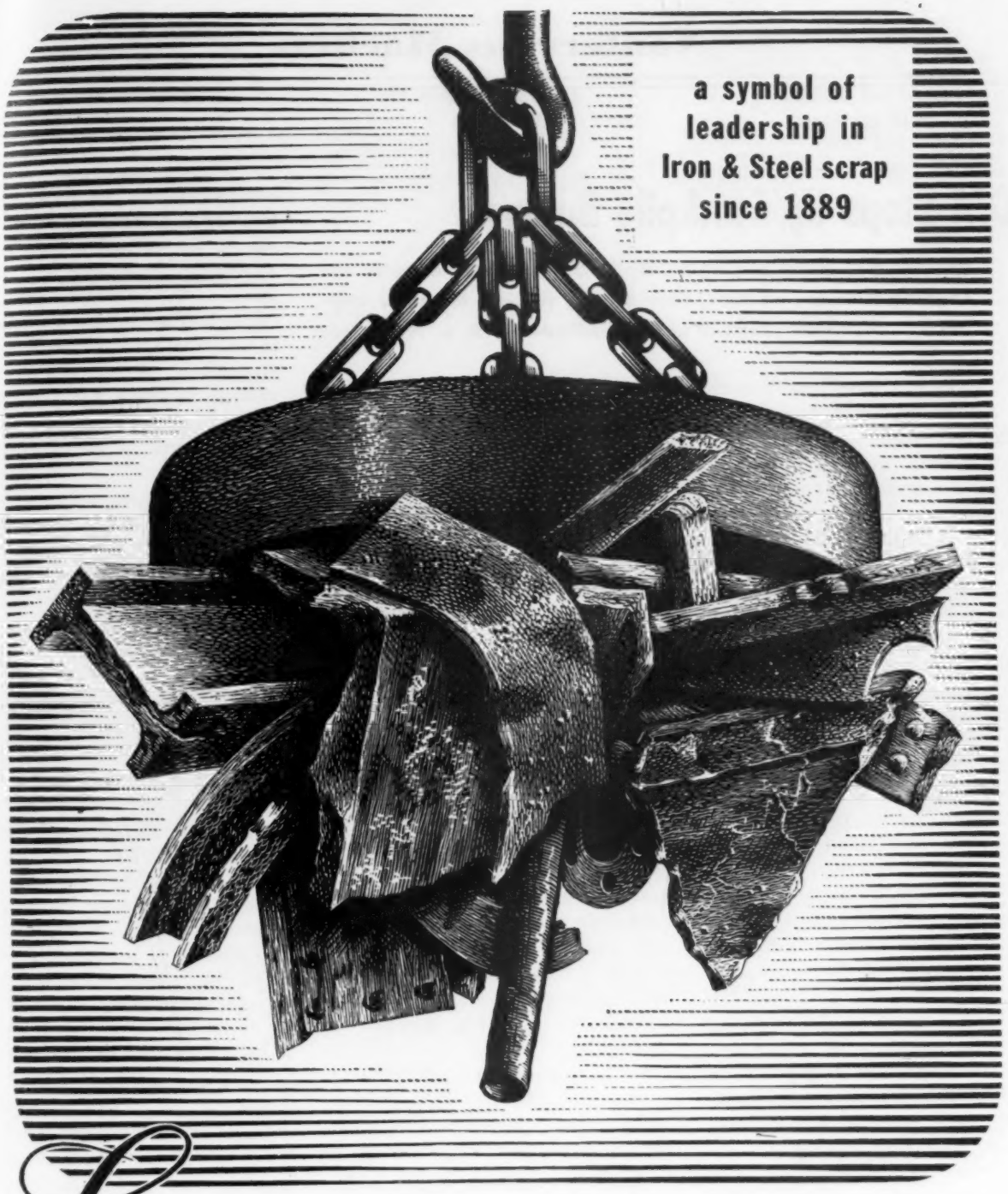
No. 1 hvy. melting	$23.00
No. 2 hvy. melting	19.00
No. 1 bundles	22.00
No. 2 bundles	19.00
No. 3 bundles	15.00
Machine shop turn.	7.00
Shoveling turnings	$9.00 to 11.00
Cast iron borings	9.00 to 11.00
Elec. fur. 1 ft and under.	28.00
No. 1 RR, hvy. melting	23.00
No. 1 cupola cast.	40.00 to 41.00

Seattle

No. 1 hvy. melting	$27.00
No. 2 hvy. melting	23.00
No. 1 bundles	24.00
No. 2 bundles	19.00
No. 1 cupola cast.	37.00
Mixed yard cast.	35.00

Hamilton, Ont.

No. 1 hvy. melting	$35.00
No 2 hvy. melting	32.00
No. 1 bundles	35.00
No. 2 bundles	30.00
Mixed steel scrap	28.50
Bushelings	27.50
Bush., new fact. prep'd.	30.50
Bush., new fact. unprep'd.	29.50
Short steel turnings	20.00
Mixed bor. and turn.	20.00
Rails, remelting	32.50
Rails, rerolling	41.80
Cast scrap	46.00



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ODM Steps Up Stockpile Buying

Accelerated metal buying by the U. S. may serve as prop for sagging metals . . . Zinc, four others, limited to minor buying . . . Aluminum, copper not so limited—By *R. L. Hatschek.*

Accelerated stockpile buying for several metals may serve as a market prop in some cases. Last week Defense Mobilizer Arthur Flemming announced revision of a number of goals.

This announcement was followed shortly by a congressional watchdog committee's report that basic industrial capacity goals had generally been reached but that shortages of certain key raw materials would limit mobilization in the event of an all-out war.

Quick Action . . . The new stockpiling directive calls for speedy results—deliveries are limited to 1 year plus lead time after date of purchase except in cases where it is advantageous to accept shipment over a longer period and where Office of Defense Mobilization has approved the delay.

Five of the metals on the new list were limited to "minor procurement" since goal quantities are either substantially on hand or on order. These are: cobalt, metal grade chromite, manganese, mercury and zinc.

Others Listed . . . Not specifically restricted in the order were: Aluminum, beryl, refractory grade chromite, columbite and tantalite, copper, battery and chemical grades of manganese, molybdenum, nickel, platinum, and solenium. Several other mineral and non-mineral materials were also included.

What will it mean to the markets? Targets are supposed to be hit without "creating undue hardship" to civilian economy. With the current outlook on some of these metals as soft as it is, this should not be too difficult. In other cases, it's questionable.

May Firm Prices . . . Zinc market is practically out on its feet right now and smelters have been trimming output in an attempt to line up supply with demand. Since zinc is limited to only minor procurement, the new directive probably won't have any great effect, though it appears that the Washington planners are at least thinking of the hard-hit mining industry.

With the freeing of Chilean copper for sales at world market prices, there's softness in the air for the red metal. Predictions are freely made that prices will come down in the New Year. But with this new order, this easing could well be delayed.

In the aluminum industry there's new emphasis on salesmanship, too, and stepped-up stockpiling should fill up order books on pig and ingot. Problem here is that much of the increased production coming from brand new potlines is below the acceptable grade for stockpiling. Producers have been voicing requests for a temporary cut in these specs to allow government buying of metal from new facilities.

High-Temperature Aluminum . . . As the aluminum industry finished a record year and moved confidently into 1954 expecting to top its records, Aluminum Co. of America's president I. W. Wilson announced the rolling of sheet using aluminum powder metallurgy (APM) metal.

Apparently because of the unusual properties of the oxide film, the APM sheet is claimed to be suitable for high-temperature applications. Alcoa foresees uses such as heat shields and other hot applications in aircraft. Air valves made from APM extrusions are operating successfully at 700 F on jet engine compressors, according to the firm.

Sees New Record . . . Predicting a "selling year" for '54, R. S. Reynolds, Jr., president of Reynolds Metals, expects production of primary aluminum to approach 1.4 million tons in the coming year. This will top the 1953 record of 1.25 million tons by 12 pct.

Nickel Hinges on Military . . . In his annual roundup, Dr. J. F. Thompson, board chairman of International Nickel Co., pointed out that much of the expected 1954 output of nickel is under contract to the U. S. for military use and stockpiling. Hence, supplies on the civilian market depend on shifts in military needs or stockpiling—and stockpiling is being hiked.

Free world nickel production in 1953 will total about 170,000 tons, topping 1952 by some 10,000 tons.

NONFERROUS METAL PRICES

(Cents per lb except as noted)

	Dec. 23	Dec. 24	Dec. 25	Dec. 26	Dec. 28	Dec. 29
Copper, electro, Conn.	29.50–30.00	29.50–30.00	....	29.50–30.00	29.50–30.00	29.50–30.00
Copper, Lake delivered	30.00	30.00	....	30.00	30.00	30.00
Tin, Straits, New York	84.25	84.00	....	....	84.00	84.00*
Zinc, East St. Louis	10.00	10.00	....	10.00	10.00	10.00
Lead, St. Louis	13.30	13.30	....	13.30	13.30	13.30

Note: Quotations are going prices
*Tentative

Nonferrous Prices

(Effective Dec. 29, 1953)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.136 in. and thicker, 2S, 3S, 33.9¢; 4S, 36.0¢; 52S, 38.2¢; 24S-O, 24S-OAL, 37.0¢; 75S-O, 75S-OAL, 44.7¢; 0.081-in., 2S, 3S, 35.1¢; 4S, 37.7¢; 52S, 39.9¢; 24S-O, 24S-OAL, 38.4¢; 75S-O, 75S-OAL, 46.9¢. 0.032-in., 2S, 3S, 37.0¢; 4S, 41.8¢; 24S-O, 24S-OAL, 46.9¢; 75S-O, 75S-OAL, 58.4¢.

Plate, ¼-in. and Heavier: 2S-F, 3S-F, 32.4¢; 4S-F, 34.5¢; 52S-F, 36.2¢; 61S-O, 35.6¢; 24S-O, 24S-OAL, 36.9¢; 75S-O, 75S-OAL, 44.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 37.4¢ to 82.8¢; 12 to 14, 38.2¢ to 99.0¢; 24 to 26, 40.9¢ to $1.29; 36 to 38, 48.4¢ to $1.89.

Rod, Rolled: 1.064 to 4.5-in., 2S-F, 3S-F, 43.8¢ to 37.2¢; cold-finished, 0.375 to 3.499-in., 2S-F, 3S-F, 47.6¢ to 39.3¢.

Screw Machine Stock: Rounds, 11S-T3, ½ to 11/32-in., 59.6¢ to 47.0¢; ⅝ to 1½-in., 46.6¢ to 43.8¢; 1 9/16 to 3-in., 42.7¢ to 39.9¢. Base 5000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 44.1¢ to 32.4¢; 52S, 53.4¢ to 39.1¢; 17S-T4, 60.1¢ to 41.8¢; 61S-T4, 53.9¢ to 41.3¢.

Extruded Tubing: Rounds, 63S-T5, OD 1¼ to 2-in., 31.6¢ to 60.7¢; 2 to 4 in., 37.7¢ to 51.1¢; 4 to 6 in., 38.2¢ to 46.6¢; 6 to 9 in., 38.7¢ to 48.8¢.

Roofing Sheet: Flat, per sheet, 0.032-in., 42¾ x 60 in., $2.838; x 96 in., $4.543; x 120 in., $5.680; x 144 in., $6.816. Coiled sheet, per lb, 0.019 in. x 28 in.

Magnesium

(F.o.b. mill, freight allowed)

Sheet and plate: FS1-O¼ in., 66¢; 3/16 in., 68¢; ½ in., 70¢; B & S Gage 10, 71¢; 12, 75¢. Specifications grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ½ to ¾ in., 60.5¢; 1¼ to 1.749 in., 56¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ⅞ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes: Rectangles: M. In weight per ft, for perimeters less than size indicated: 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, ¾ to 5/16 in., $1.43; 5/16 to ⅝ in., $1.29; ½ to ⅝ in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, ⅝ to ¾ in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(100,000 lb base, f.o.b. mill)

Commercially pure and alloy grades; Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	86½	67½	92½
Strip, CR	92½	70½	98½
Rod, bar	82½	65½	88½
Angles, HR	82½	65½	88½
Plate, HR	84½	66½	90½
Seamless Tube	115½	100½	137½
Shot, blocks	....	60	....

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	46.41	....	48.48
Copper, h-r	48.38	44.73	....
Copper, drawn	....	45.98	....
Low brass	44.47	44.41	....
Yellow brass	41.72	41.66	....
Red brass	45.44	45.38	....
Naval brass	45.76	40.07	41.33
Leaded brass	....	....	39.11
Com. bronze	46.95	46.89	....
Mang. bronze	49.48	43.62	45.18
Phos. bronze	66.58	67.08	....
Muntz metal	43.96	39.77	41.02
Ni silver, 10 pct	55.36	....	62.63

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	21.50
Aluminum pig	20.00
Antimony, American, Laredo, Tex.	28.50
Beryllium copper, per lb conta'd Be	$40.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	29.50 to 30.00
Copper, Lake, delivered	30.125
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$165 to $175
Lead, St. Louis	13.30
Lead, New York	13.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb.	27.00
Magnesium, sticks, 100 to 500 lb.	45.00 to 47.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$186 to $189
Nickel electro, f.o.b. N. Y. warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	$22 to $24
Platinum, dollars per troy oz.	$91 to $93
Silver, New York, cents per oz.	85.25
Tin, New York	84.00
Titanium, sponge	$5.00
Zinc, East St. Louis	10.00
Zinc, New York	10.50
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered carloads)

85-5-5-5 ingot	
No. 115	24.50
No. 120	23.75
No. 123	23.25
80-10-10 ingot	
No. 305	28.75
No. 315	26.50
88-10-2 ingot	
No. 210	37 50
No. 215	34.00
No. 245	29.50
Yellow ingot	
No. 405	20.75
Manganese bronze	
No. 421	25.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	23.00-23.75
0.60 copper, max.	22.75-23.25
Piston alloys (No. 122 type)	20.75-21.50
No. 12 alum. (No. 2 grade)	19.75-20.25
108 alloy	20.75-21.25
195 alloy	21.75-22.25
13 alloy (0.60 copper max.)	22.75-23.25
ASX-679	20.75-21.25

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—96-97½%	21.00-21.50
Grade 2—92-95%	20.00-20.50
Grade 3—90-92%	19.00-19.50
Grade 4—85-90%	17.25-18.00

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	44.54
Electrodeposited	38.38
Flat rolled	47.14
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	20.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	84.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	94⅛

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63.90
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz. lots, per oz.	75½
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	54.30

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	19¾	18
Red brass	23	22¼
Comm. bronze	23⅞	23⅛
Mang. bronze	18¼	17½
Yellow brass rod ends	19½	....

Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24 —24½
No. 2 copper wire	22½
Light copper	21
*Refinery brass	19½—20

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24 —24½
No. 2 copper wire	22½—23
Light copper	21 —21½
No. 1 composition	17½—18½
No. 1 comp. turnings	17 —18
Rolled brass	14½—15½
Brass pipe	15 —16
Radiators	13½—14
Aluminum	
Mixed old cast	11 —11½
Mixed new clips	12¾—13½
Mixed turnings, dry	11¼—12
Pots and pans	11 —11½

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	23 —23½
No. 2 heavy copper and wire	21 —21½
Light copper	19 —19½
New type shell cuttings	19 —19½
Auto radiators (unsweated)	12½—13
No. 1 composition	17 —17½
No. 1 composition turnings	16 —17
Unlined red car boxes	14½—15
Cocks and faucets	14½—15
Mixed heavy yellow brass	11 —11½
Old rolled brass	14 —14½
Brass pipe	16 —16½
New soft brass clippings	17 —17½
Brass rod ends	14 —15
No. 1 brass rod turnings	12 —12½

Aluminum

Alum. pistons and struts	7 — 7½
Aluminum crankcases	10 —10½
2S aluminum clippings	13 —13½
Old sheet and utensils	10 —10½
Borings and turnings	6½— 7
Misc. cast aluminum	10 —10½
Dural clips (24S)	11 —11½

Zinc

New zinc clippings	5 — 5½
Old zinc	3½— 4
Zinc routings	2 — 2½
Old die cast scrap	2½— 3¼

Nickel and Monel

Pure nickel clippings	60 —70
Clean nickel turnings	40
Nickel anodes	60 —70
Nickel rod ends	60 —70
New Monel clippings	24 —26
Clean Monel turnings	19 —21
Old sheet Monel	22 —24
Nickel silver clippings, mixed	14
Nickel silver turnings, mixed	12

Lead

Soft, scrap, lead	10½
Battery plates (dry)	5½— 5¾
Batteries, acid free	3½

Magnesium

Segregated solids	20 —21
Castings	19 —20

Miscellaneous

Block tin	65 —67
No. 1 pewter	40 —45
No. 1 auto babbitt	37 —38
Mixed common babbitt	11 —12
Solder joints	14 —14½
Siphon tops	35
Small foundry type	15
Monotype	13½
Lino. and stereotype	12½
Electrotype	11
Hand picked type shells	7 — 8
Lino. and stereo. dross	4¾— 5¼
Electro dross	3¼— 3½

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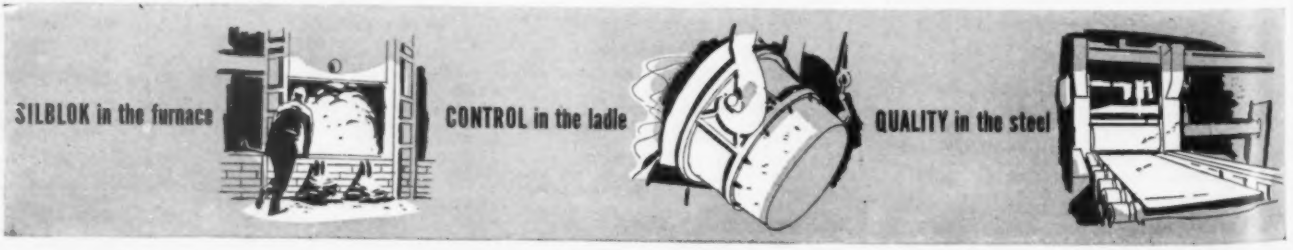


Comparison of Prices

(Effective Dec. 29, 1953)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Dec. 29 1953	Dec. 22 1953	Dec. 1 1953	Dec. 30 1952
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	3.925¢	3.925¢	3.925¢	3.775¢
Cold-rolled sheets	4.775	4.775	4.775	4.575
Galvanized sheets (10 ga.)	5.275	5.275	5.275	5.075
Hot-rolled strip	3.925	3.925	3.925	3.725
Cold-rolled strip	5.513	5.513	5.513	5.20
Plate	4.10	4.10	4.10	3.90
Plates wrought iron	9.30	9.30	9.30	9.00
Stain'l's C-R strip (No. 302)	41.50	41.50	41.50	36.75*
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$8.95	$8.95	$8.95	$8.95
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.65
Special coated mfg. ternes	7.75	7.75	7.75	7.75
Bars and Shapes: (per pound)				
Merchant bars	4.16¢	4.16¢	4.15¢	3.95¢
Cold finished bars	5.20	5.20	5.20	4.925
Alloy bars	4.875	4.875	4.875	4.675
Structural shapes	4.10	4.10	4.10	3.85
Stainless bars (No. 302)	35.50	35.50	35.50	31.50
Wrought iron bars	10.40	10.40	10.40	10.05
Wire: (per pound)				
Bright wire	5.525¢	5.525¢	5.525¢	5.226¢
Rails: (per 100 lb.)				
Heavy rails	$4.325	$4.325	$4.325	$3.775
Light rails	5.20	5.20	5.20	4.25
Semifinished Steel: (per net ton)				
Rerolling billets	$62.00	$62.00	$62.00	$59.00
Slabs, rerolling	62.00	62.00	62.00	59.00
Forging billets	75.50	75.50	75.50	70.50
Alloy blooms, billets, slabs	82.00	82.00	82.00	76.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.525¢	4.525¢	4.525¢	4.325¢
Skelp	3.75	3.75	3.75	3.55
Finished Steel Composite: (per pound)				
Base price	4.634¢	4.634¢	4.632¢	4.376¢

* Add 4.7 pct.

	Dec. 29 1953	Dec. 22 1953	Dec. 1 1953	Dec. 30 1952
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$61.19	$61.19	$61.19	$60.69
Foundry, Valley	56.50	56.50	56.50	55.00
Foundry, Southern, Cin'ti	60.43	60.43	60.43	58.93
Foundry, Birmingham	52.88	52.88	52.88	51.38
Foundry, Chicago†	56.50	56.50	56.50	55.00
Basic del'd, Philadelphia	60.27	60.27	60.27	59.77
Basic, Valley furnace	56.00	56.00	56.00	54.50
Malleable, Chicago†	56.50	56.50	56.50	55.00
Malleable, Valley	56.50	56.50	56.50	55.00
Ferromanganese‡, cents per lb.	10.00¢	10.00¢	10.00¢	8.06¢

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.

‡ Average of U. S. Prices quoted on Ferroalloy pages, 76 pct Mn basis.

Pig Iron Composite: (per gross ton)				
Pig iron	$56.59	$56.59	$56.59	$55.26
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$31.50	$31.50	$36.50	$43.00*
No. 1 steel, Phila. area	29.50	29.00	31.50	41.50*
No. 1 steel, Chicago	29.50	29.50	33.50	41.50*
No. 1 bundles, Detroit	*23.50*	23.50	27.50	41.15*
Low phos., Youngstown	33.50	33.50	36.50	46.50*
No. 1 mach'y cast, Pittsburgh	*43.50*	44.50	45.50	52.00
No. 1 mach'y cast, Philadel'a	40.50	40.50	42.00	52.00
No. 1 mach'y cast, Chicago	36.50	36.50	37.50	46.50

* Basing pt., less broker's fee. † Shipping pt., less broker's fee.

Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$30.17	$30.00	$33.83	$42.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.38	$14.38	$14.38	$14.75
Foundry coke, prompt	17.25	17.25	17.25	17.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	29.75‡	29.75‡	29.75‡	24.50
Copper, Lake, Conn.	30.00	30.00	30.125	24.625
Tin, Straits, New York	*84.00*†	84.25*	82.25	$1.21½
Zinc, East St. Louis	10.00	10.00	10.00	12.50
Lead, St. Louis	13.30	13.30	13.30	14.55
Aluminum, virgin ingot	21.50	21.50	21.50	20.00
Nickel, electrolytic	63.08	63.08	63.08	59.58
Magnesium, ingot	27.00	27.00	27.00	24.50
Antimony, Laredo, Tex.	28.50	28.50	28.50	34.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	58.00	58.50	59.00	59.50	.....
Birmingham *R3*	52.38	52.88	.....	.....	.....
Birmingham *W9*	52.38	52.88	.....	.....	.....
Birmingham *S5*	52.38	52.88	.....	.....	.....
Buffalo *R3*	56.00	56.50	57.00	.....	.....
Buffalo *H1*	56.00	56.50	57.00	.....	.....
Buffalo *W6*	56.00	56.50	57.00	.....	.....
Chicago *I4*	56.00	56.50	56.50	57.00	.....
Cleveland *A5*	56.00	56.50	56.50	57.00	61.00
Cleveland *R3*	56.00	56.50	56.50	.....	.....
Daingerfield *L3*	52.50	52.50	52.50	.....	.....
Duluth *I4*	56.00	56.50	56.50	57.00	.....
Erie *I4*	56.00	56.50	56.50	57.00	.....
Everett *M6*	.....	63.00	63.50	.....	.....
Fontana *K1*	62.00	62.50	.....	.....	.....
Geneva, Utah *C7*	56.00	56.50	.....	.....	.....
Granite City *G2*	57.90	58.40	58.90	.....	.....
Hubbard *Y1*	.....	.....	56.50	.....	.....
Minnequa *C6*	58.00	59.00	59.00	.....	.....
Monessen *P6*	56.00	.....	.....	.....	.....
Neville Isl. *P4*	56.00	56.50	56.50	.....	.....
Pittsburgh *U1*	56.00	.....	.....	57.00	.....
Sharpsville *S3*	56.00	56.50	56.50	57.00	.....
Steelton *B3*	58.00	58.50	59.00	59.50	64.00
Swedeland *A2*	58.00	58.50	59.00	59.50	.....
Toledo *I4*	56.00	56.50	56.50	57.00	.....
Troy, N. Y. *R3*	58.00	58.50	59.00	59.50	64.00
Youngstown *Y1*	.....	.....	56.50	57.00	.....
N. Tonawanda *T1*	.....	56.50	57.00	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for .05 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over.

Silvery Iron: Buffalo, *H1*, $68.25; Jackson, *J1*, *G1*, $67.00. Add $1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add $1 per ton for 0.75 pct or more phosphorus. Manganese as above. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	16.25	17.25	18.75	18.25	28.00	22.75	24.50	14.00	.....	14.25
Slabs, billets, rerolling	20.50–20.75	22.75	24.75	23.75	36.25	29.50	32.25	18.25	.....	18.50
Forg. discs, die blocks, rings	38.50	38.50	41.50	40.50	60.00	45.50	50.75	31.00	31.75	31.75
Billets, forging	29.50	29.75	32.25	31.00	46.50–46.75	35.25	39.50	24.00	24.50	24.50
Bars, wires, structurals	35.25	35.50	38.25	37.25	55.50	42.00	46.75	28.75	29.25	29.25
Plates	37.25	37.50	39.75	39.75	58.75–59.00	45.75–46.00	51.25	30.00	30.50–31.00	30.50
Sheets	46.25	46.50	48.75	48.75	64.50	55.50	60.75	40.75	41.25	43.50
Strip, hot-rolled	29.75	32.00	36.75	34.25	55.00	42.00	46.50	26.25	.....	27.00
Strip, cold-rolled	38.25	41.50	45.50	43.75	66.50	54.50	59.25	34.25	41.25	34.75

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Lockport, N. Y., *R4.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Lockport, N. Y., *S4;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *W1* (.25¢ per lb. higher); New Bedford, Mass., *R6.*

Bars: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Lockport, N. Y., *S4;* Canton, O., *T5;* Ft. Wayne, *I4.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Lockport, N. Y., *S4;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11.*

STEEL PRICES

(Effective Dec. 29, 1953)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$82.00 *B3*		4.15 *B3*	6.20 *B3*	4.15 *B3*						
	Buffalo, N. T.	$62.00 *B3*	$75.50 *B3, R3*	$82.00 *B3, R3*	4.925 *B3*	4.15 *B3*	6.20 *B3*	4.15 *B3*	3.925 *B3, R3*	5.45 *B3*	6.00 *B3*	8.425 *B3*		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.								4.05 *A2*		5.90 *A2*			
	New Bedford, Mass.									6.00 *R6*				
	Harrison, N. J.													12.00 *C11*
	Johnstown, Pa.	$62.00 *B3*	$75.50 *B3*	$82.00 *B3*		4.15 *B3*	6.20 *B3*							
	Morrisville, Pa.													
	New Haven, Conn.									5.90 *D1* 6.20 *A5*				
	Phoenixville, Pa.					4.15 *P2*		4.95 *P2*						
	Sparrows Pt. Md.								3.925 *B3*	5.45 *B3*	6.00 *B3*	8.425 *B3*		
	Wallingford, Conn.									6.20 *W1*				
	Worcester, Mass.									6.30 *A5*				12.30 *A5* 12.45 *N7*
MIDDLE WEST	Alton, Ill.								4.10 *L1*					
	Ashland, Ky.								3.925 *A7*					
	Canton-Massillon, Dover, Ohio		$75.50 *R3*	$82.00 *R3*										12.00 *G4*
	Chicago, Ill.	$62.00 *U1*	$75.50 *R3, U1, W8*	$82.00 *U1, W8, R3*	4.925 *U1*	4.10 *U1, W8*	6.175 *U1, Y1*	4.10 *U1*	3.925 *A1, W8*	5.70 *A1*	5.95 *R3*		6.40 *W8*	
	Sterling, Ill.													
	Cleveland, Ohio		$75.50 *R3*							5.45 *A5, J3*		7.80 *J3* 8.15 *A5*		12.00 *A5* 12.15 *N7*
	Detroit, Mich.		$78.50 *R5*	$84.00 *R5*					4.125 *G3* 4.15 *M2*	5.65 *D1, D2 G3, M2* 5.70 *P11*	6.15 *G3*	7.90 *D2* 8.35 *G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$62.00 *U1*	$75.50 *U1*	$82.00 *U1, Y1*	4.925 *I3*	4.10 *I3, U1*	6.175 *U1, I3*		3.925 *I3, U1, Y1*	5.70 *I3*	5.95 *U1, I3* 6.45 *Y1*		6.40 *U1*	
	Granite City, Ill.													
	Kokomo, Ind.													
	Mansfield, Ohio													
	Middletown, Ohio									5.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.								3.925 *S1*	5.45 *S1, T4*	5.95 *S1*	7.65 *S1*	6.40 *S1*	12.00 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$62.00 *U1, J3*	$75.50 *J3, U1*	$82.00 *U1, C11*	4.925 *U1*	4.10 *J3, U1*	6.175 *J3, U1*	4.10 *U1*	3.925 *A7, P6* 4.15 *S7* 4.425 *S9*	5.45 *B4, J3* 5.75 *S7*		7.80 *J3*	6.40 *S9* 6.45 *S7*	12.00 *S9* 12.15 *S7*
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					4.35 *W3*			3.925 *W3*	5.45 *F3, W3*	5.95 *W3*	8.15 *W3*		
	Youngstown, Ohio			$82.00 *Y1, C10*		4.10 *Y1*	6.675 *Y1*		3.925 *R3, U1, Y1*	5.45 *R3, Y1* 5.95 *C5*	5.95 *U1, R5* 6.45 *Y1*	7.60 *R3* 8.30 *Y1*	6.40 *U1*	12.00 *C5*
WEST	Fontana, Cal.	$70.00 *K1*	$83.50 *K1*	$101.00 *K1*		4.75 *K1*	6.825 *K1*	5.30 *K1*	4.70 *K1*	7.35 *K1*	7.05 *K1*		7.80 *K1*	13.65 *K1*
	Geneva, Utah		$75.50 *C7*			4.10 *C7*	6.175 *C7*							
	Kansas City, Mo.					4.80 *S2*	6.875 *S2*		4.625 *S2*		6.65 *S2*		7.10 *S2*	
	Los Angeles, Torrance, Cal.		$94.50 *B2*	$102.00 *B2*		4.80 *B2, C7*	6.85 *B2*		4.675 *B2, C7*	7.50 *C1*			7.60 *B2,*	
	Minnequa, Colo.					4.55 *C6*			5.025 *C6*					
	San Francisco, Niles, Pittsburg, Cal.		$94.50 *B2*			4.75 *B2* 4.91 *P9*	6.80 *B2*		4.675 *B2, C7*					
	Seattle, Wash.		$94.50 *B2, S11*			4.85 *B2*	6.90 *B2*							
SOUTH	Atlanta, Ga.								4.175 *A8*					
	Fairfield, Ala. Alabama City, Ala.	$62.00 *T2*	$75.50 *T2*			4.10 *R3, T2*	6.175 *T2*		3.925 *R3, T2*		5.95 *T2*			
	Houston, Texas		$85.50 *S2*	$92.00 *S2*		4.60 *S2*			4.425 *S2*				6.80 *S2*	

STEEL PRICES

(Effective Dec. 29, 1953)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Coke* *1.25*-lb. base box	Electro* *1.25*-lb base box	Holloware Enameling *29* ga.	
										† Special coated mfg. terne deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb deduct $2.20 from 1.25-lb coke base box. * COKES: 1.50-lb add 25¢. ELECTRO: 0.50-lb add 25¢; 0.75-lb add 65¢.			Bethlehem, Pa.
3.925 *B3*	4.775 *B3*				5.90 *B3*	7.225 *B3*			4.525 *W6*				Buffalo, N. Y.
													Claymont, Del.
													Coatesville, Pa.
4.05 *A2*					5.90 *A2*								Conshohocken, Pa.
													Harrisburg, Pa.
													Hartford, Conn.
									4.525 *B3*				Johnstown, Pa.
4.025 *U1*	4.875 *U1*									$8.80 *U1*	$7.50 *U1*	6.60 *U1*	Morrisville, Pa.
													New Haven, Conn.
													Phoenixville, Pa.
3.925 *B3*	4.775 *B3*	5.275 *B3*			5.90 *B3*	7.225 *B3*	8.075 *B3*		4.625 *B3*	$8.80 *B3*	$7.50 *B3*		Sparrows Pt., Md.
									4.825 *A5*				Worcester, Mass.
													Trenton, N. J.
									4.70 *L1*				Alton, Ill.
3.925 *A7*		5.275 *A7*	5.175 *A7*										Ashland, Ky.
		5.275 *R1, R3*						5.05 *R1*					Canton-Massillon, Dover, Ohio
3.925 *A1, W8*					5.90 *U1*				4.525 *A5, N4, R3*				Chicago, Joliet, Ill.
									4.625 *N4*				Sterling, Ill.
3.925 *J3, R3*	4.775 *J3, R3*		5.175 *R3*		5.90 *J3, R3*	7.225 *J3, R3*			4.525 *A5*				Cleveland, Ohio
4.125 *G3* 4.15 *M2*	4.975 *G3*				6.10 *G3*	7.425 *G3*							Detroit, Mich.
3.925 *N5*													Newport, Ky.
3.925 *I3, U1 Y1*	4.775 *I3, U1, Y1*	5.275 *U1* 5.325 *I3*	5.175 *I3, U1*	5.675 *U1*	5.90 *U1, I3* 6.40 *Y1*	7.225 *U1* 7.725 *Y1*				$8.70 *I3, U1, Y1*	$7.40 *I3, U1*	6.10 *U1, Y1*	Gary, Ind. Harbor, Indiana
4.125 *G2*	4.975 *G2*	5.475 *G2*	5.875 *G2*								$7.60 *G2*	6.30 *G2*	Granite City, Ill.
4.825 *C9*		5.375 *C9*						5.025 *C9*					Kokomo, Ind.
				5.675 *E2*				5.05 *E2*					Mansfield, Ohio
	4.775 *A7*		5.175 *A7*	5.675 *A7*									Middletown, Ohio
3.925 *S1* 5.175 *N3*	5.00 *N3*	5.275 *N3*	6.525 *N3*	5.45 *S1* 5.675 *N3*	5.90 *S1*						$7.40 *R3*		Niles, Ohio Sharon, Pa.
3.925 *J3, U1, P6, A7*	4.775 *J3, U1, P6*	5.275 *U1*	5.175 *U1*		5.90 *J3, U1*	7.225 *J3, U1*	7.925 *U1*		4.525 *A5* 4.725 *P6*	$8.70 *J3, U1*	$7.40 *J3, U1*	6.10 *U1*	Pittsburgh, Pa. Midland, Pa. Butler, Pa.
									4.525 *P7*				Portsmouth, Ohio
3.925 *W3, W5*	4.775 *W3, W5* 5.775 *F3*	5.275 *W3, W5*		5.675 *W3, W5*	5.90 *W3*	7.225 *W3*				$8.70 *W3, W5*	$7.40 *W3, W5*	6.55 *W5* 6.10 *F3*	Weirton, Wheeling, Follansbee, W. Va.
3.925 *R3, U1, Y1*	4.775 *R3, Y1*				5.90 *U1, R3* 6.40 *Y1*	7.225 *R3* 7.725 *Y1*			4.525 *Y1*	$8.70 *R3*			Youngstown, Ohio
4.70 *K1*	5.875 *K1*				6.675 *K1*	8.275 *K1*			5.325 *K1*				Fontana, Cal.
4.025 *C7*													Geneva, Utah
								4.775 *C6*	4.865 *S2*				Kansas City, Mo.
4.625 *C7*		6.275 *C7*							5.325 *B2*				Los Angeles, Torrance, Cal.
									4.775 *C6*				Minnequa, Colo.
4.625 *C7*	5.725 *C7*	6.025 *C7*							5.175 *C7*	$9.45 *C7*	$8.15 *C7*		San Francisco, Niles, Pittsburg, Cal.
													Seattle, Wash.
													Atlanta, Ga.
3.925 *R3, T2*	4.775 *T2*	5.275 *R3, T2*			5.90 *T2*			5.125 *T2* 5.225 *R3*	4.525 *T2 R3*	$8.80 *T2*	$7.50 *T2*		Fairfield, Ala. Alabama City, Ala.
4.425 *S2*									4.925 *S2*				Houston, Texas

STEEL PRICES

(Effective Dec. 29, 1958)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				4.875 *B3*	6.325 *B3*	6.225 *B3*					
	Buffalo, N. Y.	4.15 *B3*, 4.18 *R3*	4.15 *B3,R3*	5.25 *B5*	4.875 *B3,R3*	6.325 *B3,B5*	6.225 *B3*	4.10 *B3*			6.25 *B3*	5.525 *W6*
	Claymont, Del.							4.20 *C4*		5.55 *C4*		
	Coatesville, Pa.							4.20 *L4*		5.55 *L4*		
	Conshohocken, Pa.							4.25 *A2*	5.15 *A2*		6.25 *A2*	
	Harrisburg, Pa.							4.10 *C3*				
	Hartford, Conn.			5.75 *R3*		6.775 *R3*						
	Johnstown, Pa.	4.15 *B3*	4.15 *B3*		4.875 *B3*		6.225 *B3*	4.10 *B3*		5.55 *B3*	6.25 *B3*	5.525 *B3*
	Morrisville	4.30 *U1*	4.30 *U1*		5.025 *U1*							
	Newark, N. J.			5.65 *W10*		6.65 *W10*						
	New Haven, Conn.											
	Camden, N. J.			5.65 *P10*		6.50 *P10*						
	Putnam, Conn.			5.75 *W10*								
	Sparrows Pt., Md.		4.15 *B3*					4.10 *B3*		5.55 *B3*	6.25 *B3*	5.625 *B3*
	Palmer, Worcester, Mansfield, Mass.			5.75 *B5* 6.10 *W11*		6.775 *B5*						5.825 *A5, W6*
	Readville, Mass.			5.75 *C14*								
MIDDLE WEST	Alton, Ill.	4.35 *L1*										5.70 *L1*
	Ashland, Ky.							4.10 *A7*				
	Canton-Massillon, Ohio	4.15 *R3*		5.20 *R2,R3*	4.875 *R3*	6.325 *R2,R3*						
	Chicago, Joliet, Ill.	4.15 *U1, N4,W8* 4.22 *R3*	4.15 *R3,N4*	5.20 *A5,W10, W8,B5,L2*	4.875 *U1, W8,R3*	6.325 *A5,W8, W10,L2, R3,B5*		4.10 *U1,W8*	5.15 *U1*	5.55 *U1*	6.25 *U1*	5.525 *A1, R3,N4,W7*
	Cleveland, Ohio	4.21 *R3*	4.15 *R3*	5.20 *A5,C13*		6.325 *A5, C13*		4.10 *J3,R3*	5.15 *J3*		6.25 *J3*	5.525 *A5, R3,C13*
	Detroit, Mich.	4.30 *R5* 4.35 *G3*		5.35 *R5,P8* 5.40 *B5* 5.45 *P3*	4.975 *R5* 5.075 *G3*	6.425 *R5* 6.475 *P8* 6.525 *B5,P3*	6.425 *G3*	4.30 *G3*			6.45 *G3*	
	Duluth, Minn.											5.525 *A5*
	Gary, Ind. Harbor, Crawfordsville,	4.15 *I3, U1, Y1*	4.15 *I3, U1, Y1*	5.20 *R3*	4.875 *I3, U1, Y1*	6.325 *R3,M5*	6.225 *U1,I3* 6.725 *Y1*	4.10 *I3, U1, Y1*	5.15 *I3*	5.55 *U1*	6.25 *U1,I3* 6.75 *Y1*	5.625 *M4*
	Granite City, Ill.							4.30 *G2*				
	Kokomo, Ind.											5.625 *C9*
	Sterling, Ill.	4.25 *N4*	4.25 *N4*									5.625 *N4*
	Niles, Ohio Sharon, Pa.							4.10 *S1*		5.55 *S1*	6.25 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.15 *J3, U1*	4.15 *J3, U1*	5.20 *A5,J3, W10,R3,C8*	4.875 *U1,C11*	6.325 *A5,C11, W10,C8*	6.225 *J3, U1*	4.10 *J3, U1*	5.15 *U1*	5.55 *U1*	6.25 *J3, U1*	5.525 *A5, J3,P6*
	Portsmouth, Ohio											5.525 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.15 *W3*						4.10 *W3*				
	Youngstown, Ohio	4.15 *U1, Y1* 4.20 *R3*	4.15 *R3, U1, Y1*	5.20 *Y1,F2*	4.875 *U1,Y1, C10*	6.325 *Y1, C10,F2*	6.225 *U1* 6.725 *Y1*	4.10 *R3, U1, Y1*			6.75 *Y1*	5.525 *Y1*
WEST	Emeryville, Cal.	4.90 *J5*	4.90 *J5*									
	Fontana, Cal.	4.85 *K1*	4.85 *K1*		5.925 *K1*		7.475 *K1*	4.75 *K1*		6.60 *K1*	6.95 *K1*	
	Geneva, Utah							4.10 *C7*			6.25 *C7*	
	Kansas City, Mo.	4.85 *S2*	4.85 *S2*		5.575 *S2*		6.925 *S2*					6.125 *S2*
	Los Angeles, Torrance, Cal.	4.85 *B2,C7*	4.85 *B2,C7*	6.65 *R3*	5.925 *B2*		6.925 *B2*					6.475 *B2*
	Minnequa, Colo.	4.60 *C6*	4.75 *C6*					4.95 *C6*				5.775 *C6*
	Portland, Ore.	4.90 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	4.85 *C7,P9* 4.90 *B2*	4.85 *C7,P9* 4.90 *B2*				6.975 *B2*					6.475 *C7*
	Seattle, Wash.	4.90 *B2,N6*	4.90 *B2,S11*				6.975 *B2*	5.00 *B2*			7.15 *B2*	
SOUTH	Atlanta, Ga.	4.40 *A8*	4.40 *A8*									5.725 *A8*
	Fairfield, Ala. Alabama City, Ala.	4.15 *T2* 4.18 *R3*	4.15 *R3,T2*				6.225 *T2*	4.10 *R3,T2*			6.25 *T2*	5.525 *R3, T2*
	Houston, Texas Ft. Worth, Texas	4.65 *S2*	4.65 *S2*		5.375 *S2*			4.60 *S2*				5.925 *S2*

Steel Prices

(Effective Dec. 29, 1953)

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Glassport, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp. Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co. Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Sweet's Steel Co., Williamsport, Pa.
S11 Seidelhuber Steel Rolling Mills, Seattle

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Fort Worth

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.

Y1 Youngstown Sheet & Tube Co., Youngstown

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. *B3*	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0								
Youngstown *R3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Fontana *K1*	13.25	+2.0	16.25	1.0	18.75	4.5	21.25	5.5	21.75	6.5	22.25	7.0	23.75	7.0								
Pittsburgh *J3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Alton, Ill. *L1*	24.25	8.0	27.25	12.0	29.75	15.5	32.25	16.5	32.75	17.5	33.25	18.0	34.75	18.0								
Sharon *M3*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Pittsburgh *N1*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Wheeling *W5*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Wheatland *W4*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0								
Youngstown *Y1*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6.5
Indiana Harbor *Y1*	25.25	9.0	28.25	13.0	30.75	16.5	33.25	17.5	33.75	18.5	34.25	19.0	35.75	19.0								
Lorain *N2*	26.25	10.0	29.25	14.0	31.75	17.5	34.25	18.5	34.75	19.5	35.25	20.0	36.75	20.0	15.75	0.0	19.75	2.5	22.25	5.0	23.75	6 5
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0								
Youngstown *R3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Fontana *K1*	16.75		20.75		22.75		23.25		23.75		24.25		24.75									
Pittsburgh *J3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Alton, Ill. *L1*	27.75	13.0	31.75	17.0	33.75	20.5	34.25	19.5	34.75	20.5	35.25	21.0	35.75	20.0								
Sharon *M3*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Pittsburgh *N1*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Wheeling *W5*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Wheatland *W4*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0								
Youngstown *Y1*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75
Indiana Harbor *Y1*	28.75	14.0	32.75	18.0	34.75	21.5	35.25	20.5	35.75	21.5	36.25	22.0	36.75	21.0								
Lorain *N2*	29.75	15.0	33.75	19.0	35.75	22.5	36.25	21.5	36.75	22.5	37.25	23.0	37.75	22.0	16.25	0.75	20.75	3.75	23.75	6.75	28.75	9.75

Galvanized discounts based on zinc, at 11¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in. 3 in. ½ pt. Calculate discounts on even cents per lb of zinc i.e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢. Threads only buttweld and seamless, 2¼ pts. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 4½ pts. higher discount. Buttweld jobbers' discount, 5 pct. East St. Louis zinc price now 10.0¢.

Steel Prices

(Effective Dec. 29, 1953)

CLAD STEEL

	Plate	Sheet
Stainless-carbon		
No. 304, 20 pct.		
Coatesville Pa., *L4*	*32.7	
Washington, Pa. *J2*	....	
Claymont, Del. *C4*	....	
New Castle, Ind *I2*	....	32.50
Nickel-carbon		
10 pc. Coatesville, Pa. *L4*	37.5	
Inconel-carbon		
10 pct. Coatesville, Pa. *L4*	46.10	
Monel carbon		
10 pct Coatesville, Pa. *L4*	38.90	
Aluminized steel sheets, hot dip, Butler, Pa., *A7*	....	....

* Includes annealing and pickling, sandblasting.

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$110.30 to $113.80
6 to 24-in., del'd N. Y.	113.50 to 114.50
6 to 24-in., Birmingham	96.50 to 101.00
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments. rail and water shipments less	$128.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

ELECTRICAL SHEETS

22 Ga. H-R cut length F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech Bottom *W5*	....	8.35	9.60	10.40	10.95	11.50	12.20
Brackenridge *A3*	....	8.35	9.60	10.40	10.95	.....	12.20
Granite City *G2*	....	8.55	9.80	.....	.....	.....	.....
Ind Harbor *I3*	7.85	8.35	9.60	.....	.....	.....	.....
Mansfield *E2*	7.85	8.35	9.60	10.40	.....	.....	.....
Newport, Ky. *N5*	7.85	8.35	9.60	10.40	10.95	.....	.....
Niles, O. *N3*	7.85	8.35	.....	.....	.....	.....	.....
Vandergrift *U1*	8.15	8.75	9.75	10.65	11.60	12.15	12.65
Warren, O. *R3*	7.85	8.35	9.60	.....	.....	.....	.....
Zanesville *A7*	7.85	8.35	9.60	10.40	10.95	11.50	12.20

TOOL STEEL

F.o.b. Mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.66
18	4	1	—	5	2.34
18	4	2	—	—	1.82
1.5	4	1.5	8	—	.895
6	4	2	6	—	1.065

High-carbon chromium	.70
Oil hardened manganese	.39
Special carbon	.355
Extra carbon	.30
Regular carbon	.15

Warehouse prices on and east of Mississippi are 3.5¢ per lb. higher. West of Mississippi, 5.5¢ higher.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence 9–15½ ga.	"T" Fence Posts	Single Loop Bale Ties	Twisted Barbless Wire	Galv. Barbed Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire* Galv. ¢/lb.
Alabama City *R3*	131	140	...	149	...	153	6.675	7.075
Aliquippa, Pa. *J3*	131	143	...	...	...	150	6.675	7.20
Atlanta *A8*	133	145	...	151	...	158	6.775	7.30
Bartonsville *K2*	131	143	...	...	...	156	...	...
Buffalo *W6*	...	...	...	...	...	...	...	...
Chicago, Ill. *N4*	131	143	...	149	156	156	6.675	7.20
Cleveland *A6*	137	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	...	6.675	...
Crawfordsvl. *M4*	133	145	...	151	...	153	6.775	7.325
Donora, Pa. *A5*	131	140	...	149	...	153	6.675	7.075
Duluth *A5*	131	140	145	149	...	153	6.675	7.075
Fairfield, Ala. *T2*	131	140	...	149	...	153	6.675	7.075
Galveston *D4*	139	148	...	...	...	...	...	...
Houston *S2*	139	151	...	...	...	164	7.075	7.425
Johnstn., Pa. *B3*	131	143	145	...	156	156	6.675	7.225
Joliet, Ill. *A5*	131	140	...	149	...	153	6.675	7.075
Kokomo, Ind. *C9*	133	142	...	151	...	155	6.775	7.175
Los Angeles *B2*	...	...	...	...	...	...	7.625	...
Kansas City *S2*	143	155	...	161	...	168	7.275	7.825
Minnequa *C6*	136	148	150	154	162	162	6.925	7.325
Monessen *P6*	131	145	...	...	...	157	6.675	7.225
Moline, Ill. *R3*	...	...	145	...	...	...	...	...
Pittsburg, Cal. *C7*	150	163	...	173	173	173	7.625	8.025
Portsmouth *P7*	132	...	...	...	...	...	6.575	...
Rankin, Pa. *A5*	131	140	...	...	...	153	6.675	7.075
So. Chicago *R3*	131	140	145	149	...	153	6.675	7.075
S. San Fran. *C6*	...	...	...	...	...	173	...	...
Sparrows Pt. *B3*	133	...	...	151	158	158	6.775	7.325
Struthers, O. *Y1*	...	...	...	...	...	...	6.675	7.175
Worcester *A5*	137	...	...	...	...	...	6.975	...
Williamsport, Pa. *S10*	133	...	158	...	...	...	...	...

Cut Nails, carloads, base $8.00 per keg (less 20¢ to jobbers), at Conshohocken, Pa. (*A2*).

* Alabama City and So. Chicago don't include zinc extra. Galvanized products computed with zinc at 11.0¢ per lb.

WAREHOUSES

Base price f.o.b., dollars per 100 lb.

Cities	City Delivery Charge	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structure	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	$.20	6.20	7.64	7.78	7.00	.....	6.85	6.98	6.86	8.17	.....	.....	.....	.....
Birmingham	.15	6.15	7.00	8.00[4]	6.30	.....	6.35	6.35	6.15	8.75	.....	.....	.....	.....
Boston	.20	6.89	7.83	9.18	7.13	9.23–9.35[2]	7.13	7.06	6.87	8.35	.....	12.05	.....	14.50
Buffalo	.20	6.20–6.35	7.15–7.70	9.00–9.01	6.65–6.79	.....	6.65–6.68	6.55–6.59	6.35	7.70	.....	11.95	.....	14.25
Chicago	.20	6.18	7.12	8.00	6.42	.....	6.33–6.38	6.46	6.28	7.30	.....	11.75	.....	14.25
Cincinnati	.15	6.51	7.19	8.42	6.72	.....	6.75	6.93	6.58	7.66	.....	12.17	.....	14.87
Cleveland	.20	6.18	7.12	7.90	6.58	.....	6.50	6.79	6.34	7.65	.....	11.89	.....	14.39
Denver	.....	7.95	8.85	10.47	8.20	9.55	7.95	7.95	8.05	9.05	.....	16.05	.....	15.75
Detroit	.20	6.35–6.45	7.25–7.32	8.29	6.30–7.31	7.36–8.35	7.00	6.93	6.56–6.57	7.60–7.69	12.27	12.12	14.52	13.44–14.62
Houston	.20	.15	7.60–7.85	9.40	7.45	.....	7.20	7.35	7.45	9.30	.....	12.95	.....	.....
Kansas City	.20	6.85	7.79	8.67	7.09	.....	7.00–7.05	7.13	6.95	8.08	.....	12.42	.....	.....
Los Angeles	.20	7.25	9.00	9.35	7.55	10.75–11.30	7.20	7.35	7.15–7.25	9.10–9.75	13.20	13.05	15.75	15.85–16.05
Memphis	.10	6.79	7.69	.....	6.90	.....	7.01	7.09	6.88	7.89–8.31	.....	.....	.....	.....
Milwaukee	.20	6.35	7.12	8.00–8.17	6.59–6.60	8.07	6.50–6.55	6.61–6.63	6.45	7.57	.....	11.92	.....	14.42
New Orleans	.15	6.51	7.41	9.32	6.63	10.42	6.73	6.81–7.45	6.60	8.42–10.42	.....	.....	.....	.....
New York	.30	6.78	7.75[6]–8.20	8.42–9.00[3]	7.16	9.05	6.99	6.90	7.06	8.43	12.29	12.14	14.54	14.64
Norfolk	.20	6.90	.....	.....	7.20	.....	7.15	7.20	7.20	8.50	.....	.....	.....	.....
Philadelphia	.25	6.53	7.55	8.65	7.02	.....	6.63	6.67	6.87	8.24	12.04	11.89	14.29	14.39
Pittsburgh	.20	5.95–6.18	6.82–7.12	7.95–8.00	6.20–6.55	.....	6.03–6.33	6.07–6.46	5.98–6.28	7.65	.....	11.45–11.75	.....	13.75–14.25
Portland	.10	8.15–8.95	8.70–9.85	9.40	7.90	.....	7.55	7.50	7.60	10.05	.....	.....	.....	.....
Salt Lake City	.20	9.05	10.80	10.65	9.35	11.25	8.70	8.85	9.10–9.20	11.25	.....	.....	.....	.....
San Francisco	.20	7.35	8.70	9.90–10.15	7.60	10.35	7.20	7.25	7.15	9.75–9.85	13.20	12.80–13.05	15.50	15.55–16.05
Seattle	.20	8.15	9.50	9.80	8.00	.....	7.60	7.50	7.60	10.65	.....	13.40	.....	16.00
St. Louis	.20	6.48	7.42	8.30	6.72	8.47	6.73	6.86	6.58	7.50–7.70	12.20	12.05	12.20	14.55
St. Paul	.15	6.84	7.78	8.66	7.08	.....	6.99	7.12	6.94	8.06	.....	12.42	.....	.....

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

Exceptions: (1)500 to 1499 lb. (2)20,000 lb or over. (3)450 to 1499 lb. (4)500 to 9999 lb. (5)1000 lb or over. (6)400 to 1499 lb.

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, Conn. *S7**	5.75	7.65	8.60	10.55	12.85
Carnegie, Pa. *S9*	.....	7.65	8.60	10.55	12.85
Cleveland *A5*	5.45	7.65	8.60	10.55	12.85
Detroit *D1*	5.65	7.85	8.45	10.55	.....
Detroit *D2*	5.65	7.85	8.80	.....	.....
Harrison, N. J. *C11*	.....	.....	8.90	10.85	13.15
New Castle, Pa. *B4*	5.80	8.00	8.60	.....	.....
New Haven, Conn. *D1*	5.90	7.95	8.55	10.65	.....
Riverdale, Ill. *A1*	5.70	7.80	8.75	10.70	13.00
Sharon, Pa. *S1*	5.45	7.65	8.60	10.55	12.85
Trenton *R4*	.....	7.95	8.90	10.85	13.15
Wallingford, *W1*	6.20	7.95	8.90	10.85	13.15
Warren, Ohio *T4*	5.45	7.65	8.60	10.55	12.85
Weirton, W. Va. *W3*	5.45	7.65	8.60	10.55	12.85
Worcester, Mass. *A5*	6.30	7.95	8.90	10.85	13.15
Youngstown *C5*	.....	8.00	8.60	10.55	12.85

* Sold on Pittsburgh base.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size: OD-In.	Size: B.W. Ga.	Seamless: H.R.	Seamless: C.D.	Elec. Weld: H.R.	Elec. Weld: C.D.
Babcock & Wilcox	2	13	30.08	36.28	26.51	31.98
	2½	12	40.51	48.86	35.70	43.07
	3	12	45.92	55.39	41.23	49.73
	3½	11	53.60	64.65	48.13	58.06
	4	10	65.91	79.50	63.92	77.10
National Tube	2	13	....	32.98	26.51	.....
	2½	12	36.82	44.41	35.70	.....
	3	12	42.52	51.28	41.23	.....
	3½	11	49.63	59.87	48.13	.....
	4	10	65.91	79.50	63.92	.....
Pittsburgh Steel	2	13	27.34	32.98	.....	.....
	2½	12	36.82	44.41	.....	.....
	3	12	42	52	51.28	.....
	3½	11	49.63	59.87	.....	.....
	4	10	65.91	79.50	.....	.....

(Effective Dec. 29, 1953)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	4.325	5.20	5.275	....	....	....	....
Chicago *R3*	....	....	....	7.05	....	....	....
Cleveland *R3*	....	....	....	....	....	....	....
Ensley *T2*	4.325	5.20	....	....	....	....	....
Fairfield *T2*	....	5.20	....	....	....	5.125	....
Gary *U1*	4.325	5.20	....	....	....	5.125	....
Ind. Harbor *I3*	4.325	....	5.275	7.05	....	5.125	....
Johnstown *B3*	....	5.20	....	....	....	....	....
Joliet *U1*	....	5.20	5.275	....	....	....	....
Kansas City *S2*	....	....	....	7.30	....	....	11.00
Lackawanna *B3*	4.325	5.20	5.275	....	....	5.125	....
Lebanon *B3*	....	....	....	7.05	10.50	....	11.00
Minnequa *C6*	4.325	5.70	5.275	7.05	....	5.125	11.00
Pittsburgh *O1*	....	....	....	....	10.50	....	11.00
Pittsburgh *P5*	....	....	....	....	10.50	....	11.00
Pittsburgh *J3*	....	....	....	7.05	....	....	....
Pitt's, Cal. *C7*	....	....	....	....	....	5.275	....
Seattle *B2*	....	....	....	7.55	....	5.275	11.50
Steelton *B3*	4.325	....	5.275	....	....	5.125	....
Struthers *Y1*	....	....	....	....	....	....	....
Torrance *C7*	....	....	....	....	....	5.275	....
Youngstown *R3*	....	....	....	7.05	....	....	....

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. Prices effective July 1, 1953, to end of season.

	Gross Ton
Openhearth lump	$11.15
Old range, bessemer	10.30
Old range, nonbessemer	10.15
Mesabi, bessemer	10.05
Mesabi, nonbessemer	9.90
High phosphorus	....

Prices based on upper Lake rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on June 24, 1953. Increases or decreases after such date are for buyer's account.

COKE

	Net-Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.25 to $14.50
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.50 to $17.00
Foundry, oven coke	
Buffalo, del'd	$28.08
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.95
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, del'd	23.21
Lone Star, Tex., f.o.b.	18.50

ELECTRODES

Cents per lb, f.o.b. plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
24	84	20.50
20	72	20.00
12, 14, 18	72	20.50
7 to 10	60	21.00
6	60	23.25
4	40	26.00
3	40	27.25
2½	30	28.00
2	24	43.50
	CARBON	
40	100, 110	8.95
35	110	8.95
30	110	9.95
24	72 to 84	9.10
20	90	8.95
17	72	9.10
14	72	9.50
10, 12	60	10.30
8	60	10.55

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List Less Keg Reg.	K.	Less Keg Hvy.	K.
½ in. & smaller	+2	15	+2	18
9/16 in. & ⅝ in.	+7	11	+32*	+10*
¾ in. to 1½ in. inclusive	+8	10	+27**	+6**
1⅝ in. & larger	+9	9	+27	+6

* 9/16 to ¾ in.
** ⅞ to 1½ in.

Nuts, Hot Pressed—Hexagon

½ in. & smaller	11	26	8	23
9/16 in. & ⅝ in.	2	18	+20	net
¾ in. to 1½ in. inclusive	+6	12	+25	+4
1⅝ in. & larger	+8	10	+25	+4

Nuts, Cold Punched—Hexagon

½ in. & smaller	11	26	8	23
9/16 in. & ⅝ in.	9	24	+2	15
¾ in. to 1½ in. inclusive	+1	16	+9	9
1⅝ in. & larger	+16	3	+20	net

Nuts, Semi-Finished—Hexagon

½ in. & smaller	23	36	14	28
9/16 in. & ⅝ in.	18	32	4	20
¾ in. to 1½ in. inclusive	8	23	+8	10
1⅝ in. & larger	+14	5	+20	net
	Light			
7/16 in. & smaller	33	43		
½ in. thru ⅝ in.	26	37		
¾ in. to 1½ in. inclusive	18	30		

Stove Bolts *Pct Off List*

Packaged, steel, plain finished	44½—10
Packaged, plain finish	25½—10
Bulk, plain finish**	59*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets *Base per 100 lb*

½ in. & larger	$8.90
	Pct Off List
7/16 in. and smaller	30

Cap and Set Screws

(In bulk)	Pct Off List
Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	40
¾ in. thru 1 in. up to & including 6 in.	26
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	43
¾ in. thru 1 in. up to & including 6 in.	33
Milled studs	17
Flat head cap screws, listed sizes	12
Fillister head cap, listed sizes	7
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	37

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	4	20
9/16 in. & ⅝ in. x 6 in. & shorter	5	21
¾ in. & larger x 6 in. & shorter	3	19
All diam. longer than 6 in.	+4	13
Lag, all diam. x 6 in. & shorter	12	27
Lag, all diam. longer than 6 in.	8	23
Plow bolts	30	

REFRACTORIES

Fire Clay Brick *Carloads, per 1000*

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$109.00
No. 1 Ohio	102.00
Sec. quality, Pa., Md., Ky., Mo. Ill.	102.00
No. 2 Ohio	93.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	16.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$115.00
Childs, Hays, Pa.	120.00
Chicago District	125.00
Western Utah	131.00
California	138.00
Super Duty Hays, Pa., Athens, Tex., Windham	132.00
Curtner, Calif.	150.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	19.00
Silica cement, net ton, bulk, Hays, Pa.	21.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	20.00
Silica cement, net ton, bulk, Utah and Calif.	28.50

Chrome Brick *Per net ton*

Standard chemically bonded Balt.	$86.00
Standard chemically bonded, Curtner, Calif.	96.25
Burned, Balt.	80.00

Magnesite Brick

Standard Baltimore	$109.00
Chemically bonded, Baltimore	97.50

Grain Magnesite *St. ⅝-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed	$64.40
Domestic, f.o.b. Chewalah, Wash., in bulk	38.00
in sacks	43.75

Dead Burned Dolomite *Per net ton*

F.o.b., bulk, producing points in: Pa., W. Va., Ohio	$14.50
Midwest	14.60
Missouri Valley	13.65

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill.
Price, net ton; Effective CaF_2 content

72½%	$44.00
70% or more	42.50
60% or less	38.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron, c.i.f. New York, ocean bags	11.25¢
Canadian sponge iron, del'd. in East	12.0¢
Domestic sponge iron, 98+% Fe, carload lots	18.0¢
Electrolytic iron, annealed, 99.5+% Fe	44.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	60.0¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe	83.0¢ to $1.48
Aluminum	31.5¢
Brass, 10 ton lots	29.50¢ to 36.50¢
Copper, electrolytic	43.50¢
Copper, reduced	43.50¢
Cadmium, 100-199 lb 95¢ plus metal value	
Chromium, electrolytic, 99% min., and quality, del'd	$3.60
Lead	21.75¢
Manganese	57.0¢
Molybdenum, 99%	$2.75
Nickel, unannealed	89.50¢
Nickel, annealed	96.50¢
Nickel, spherical, unannealed	93.50¢
Silicon	43.50¢
Solder powder 70¢ to 90¢ plus met. value	
Stainless steel, 302	91.0¢
Stainless steel, 316	$1.10
Tin	14.04¢ plus metal value
Tungsten, 99% (65 mesh)	$5.35
Zinc, 10 ton lots	17.5¢ to 25.0¢

Ferroalloy Prices

(Effective Dec. 29, 1953)

Ferrochrome

Contract prices, cents per lb contained Cr, lump size, bulk, in carloads, delivered.

65-72 Cr, 2% max. Si.

0.025% C	34.50	0.20% C	33.50
0.06% C	34.50	0.50% C	33.25
0.10% C	34.00	1.00% C	32.00
0.15% C	33.75	2.00% C	32.75
65-69% Cr, 4-9% C			24.75
62-66% Cr, 4-6% C, 6-9% Si			25.60

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	25.85
Ton lost	28.00
Less ton lots	29.50

High-Nitrogen Ferrochrome

Low-carbon type 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.18
0.50% max. C	1.14
9 to 11% C	1.11

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed, lump 4-in. x down, bulk 2-in. x down, 25.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.

Bulk 1-in. x down, 25.90¢ per lb contained Cr plus 12.69¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, lump delivered.

30-33% Cr, 60-65% Si, 3.00% max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	17.50
Ton lots to carload packed	18.50
Less ton lots	20.00

Ferromanganese

Maximum contract base price, f.o.b., lump size:

Producing Point	Base Mn Content	Cents per lb (Contained Mn)
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	76-80%	13.15
		(Per lb of ferromanganese)
Clairton, Pa.	74-76%	10.00
Johnstown, Pa.	74-76%	10.00
Sheridan, Pa.	74-76%	10.00

Add or subtract 0.1¢ for each 1% Mn above or below base content.

Briquets—delivered, 66 pct Mn.

Carloads, bulk	12.50
Ton lots, packed	14.05

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$84.00
19 to 21%	3% max.	86.00
21 to 23%	3% max.	88.50
23 to 25%	3% max.	91.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	36.95
Ton lots	38.45

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	31.50
Ton lots	33.50
Less ton lots	35.50
Premium for hydrogen-removed metal	1.50

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ..... 21.35¢

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	30.00	31.85	33.05
0.07% max. C	27.95	29.80	31.00
0.15% max. C	27.45	29.30	30.50
0.30% max. C	26.95	28.80	30.00
0.50% max. C	26.45	28.30	29.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	23.45	25.30	26.50

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.

Carload bulk	11.40
Ton lots	13.05
Briquet contract basis carlots, bulk delivered, per lb of briquet	12.65
Ton lots, packed	14.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $95.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00. Add $1.00 per ton for each additional 0.50% Si up to and including 17%. Add $1.45 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton Lots	Carloads
96% Si, 2% Fe	20.10	18.00
97% Si, 1% Fe	20.60	18.50

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, delivered.

25% Si	20.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
65% Si	13.60	90.95% Si	17.00

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

35-55% contract basis, delivered, per pound, contained V.

Openhearth	$3.00-$3.10
Crucible	3.10- 3.20
High speed steel (Primos)	3.20- 3.25

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis f.o.b. Suspension Bridge, N. Y.

Carloads	9.90
Ton lots	11.30

Calcium molybdate, 46.3-46.6% f.o.b Langeloth, Pa., per pound contained Mo. $1.15

Ferrocolumbium, 50-60% 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.04
Less ton lots	6.45

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30% C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $4.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo $1.32

Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00

10 tons to less carload $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50

Less ton lots 1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W. ton lots, f.o.b. $4.45

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.14

bags, f.o.b. Washington, Pa. Langeloth, Pa. $1.11

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Carload, bulk lump	14.50¢
Ton lots, bulk lump	15.75¢
Less ton lots, lump	16.25¢

Vanadium Pentoxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.28

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.

Carload, bulk ..... 8.00¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B.... $5.35

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound ..... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, Ton lots.... $1.20

F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.85
14 to 10% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.

No. 1	$1.00
No. 6	68¢
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots	01.46
Less ton lots	1.57

Nickel-Boron, 15-18%, B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered

Less ton lots $2.05

Silcaz, contract basis, delivered.

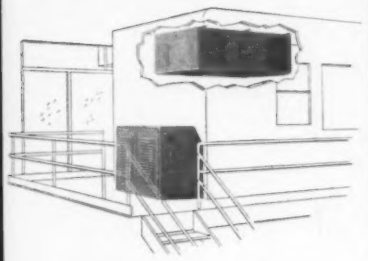
Ton lots ..... 45.00¢

Your industrial air conditioning problem is solved with DRAVO'S COMPLETE LINE OF EQUIPMENT

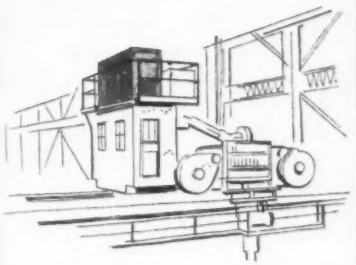
If your working area is subject to radical temperature variations and unhealthy atmospheric conditions, there's a Dravo air conditioning unit specifically designed to eliminate these hazards.

Dravo industrial air conditioning equipment filters the air, removes dust, dirt and fumes; heats in the winter, cools in the summer and provides year around ventilation.

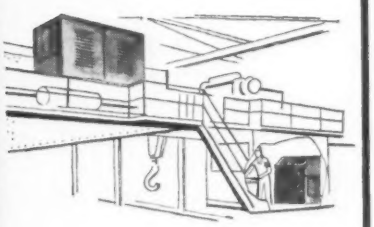
DRAVO OFFERS THESE UNITS



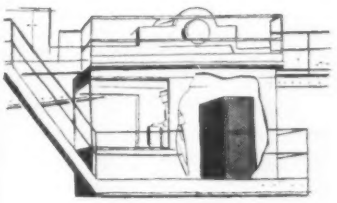
NEW PULPIT AIR CONDITIONER for blooming mill, strip mill, rod mill pulpit and many other industrial applications. Maintains 80-85°F in summer and 68-72°F in winter. Evaporator section is mounted inside the pulpit with a suitable cabinet for controls. Condenser section is located outside wherever convenient. Refrigerant piping joins the two sections.



SELF-CONTAINED CRANE CAB COOLERS—mounted alongside the cab or on the cab roof. Only electrical leads and connections required. Thermostat control—fully automatic—maintains 85°F temperature with ambient temperatures up to 175°F. Ideal for installation on all types of cranes working over "hot spots" in steel and other metal-working industries.



SPLIT-TYPE CRANE CAB COOLERS—installed in two sections—the heavy condenser unit on the crane wherever you want it—the light cooling section in the cab with the operator. Two sections joined only with refrigerant pipe and electrical connections.



SMALL HEATERS AND VENTILATORS—especially designed to filter dust and dirt, remove fumes, provide constant ventilation, supply heat in winter. Ideal for crane or power shovel cabs in quarrying, slag, cement and similar industries to eliminate hazards which reduce operators' efficiency.

. . . to safeguard health, increase efficiency and improve production in your operation.

ALL UNITS AVAILABLE FOR IMMEDIATE DELIVERY . . . units are quickly and easily installed with a minimum of downtime required. Parts interchangeable on all units.

For more information write to Dravo Corporation, Air Conditioning Department, Fifth and Liberty Avenues, Pittsburgh 22, Penna. Ask for Bulletin SC 1301-910.

DRAVO
CORPORATION
PITTSBURGH, PENNA.
Sales Representatives in Principal Cities

RE-NU-BILT
GUARANTEED
ELECTRIC POWER EQUIPMENT

D. C. MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	2200	G.E.	MCF	600	400/500
1	2000	Whse.	Mill	600	230/460
1	940	Whse.	QM	230	140/170
1	900	Whse.		250	450/550
1	825	Whse.		250	95/190
1	600	Al. Ch.		250	400/800
1	500	Whse.	CC-216	600	300/900
2	450	Whse.		550	415
1	400	G.E.	MCF	550	300/1050
2	300	Whse.	CB-5094	250	575/1150
1	200/300	G.E.	MPC	230	360/920
1	200	Rel.	1970T	230	720
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	1150
8	150	Cr. Wh.	83H-TEFC	230	960
1	150	Whse.	SK-151B	230	900/1800
1	150	Whse.	SK-201	230	360/950
1	50/120	G.E.	MCF	230	250/1000
2	100	Whse.	SK-181	230	450/1000
1	100	G.E.	CDP-115	230	1750

MILL & CRANE

1	50	G.E.	CO-1810	230	725
1	20	Whse.	K-5	230	975
4	15	Whse.	K-5	230	630
3	10	C&W.	SCM-AH	230	1150
1	10	G.E.	MD-104	230	400/800
3	6.25	Whse.	K-3	230	680
4	3	C.W.	SK-181	230	450/1000
2	3	Whse.	CDP-115	230	1750

A.C. MOTORS

3 phase—60 cycle

SLIP RING

Qu.	H.P.	Make	Type	Volts	Speed
1	1500	G.E.	MT-498	2300	360
1	1500	ABB		2300	720
1	1200	G.E.	MT	2300	275
2	1000	A.C.	MH	2300	240
1	500	Whse.	CW	550	350
1	500	G.E.	I-M	2300	900
1	400	Whse.	CW	440	514
1	400	Whse.	CW-1218	2200	435
1	350	G.E.	MT-442Y	2200/4000	253
2	300	G.E.	MT-565Y	2300	900
1	250	G.E.	MT-424-Y	4000	257
1	250	G.E.	MT-559S	2200	1800
1	250	Al. Ch.		550	600
1	200	Cr. Wh.	26QB	440	595
1	200	G.E.	IM-16	440	600
1	200	G.E.	IM	440	435
1	200	G.E.	MTP	440	1170
1	150(unused)	Whse.	CW	2300	435
1	150	G.E.	IM-16	440	600
2	125	A.C.		440	865
1	125	Al. Ch.		440	720
4	125	G.E.	MT-566Y	440/2200	435
1	100	G.E.	IM	440	600
5	100	A.C.	ANY	440	895
1	100	G.E.	IM-16	2200	435
1	100	Whse.	CW-868A	440	700

SQUIRREL CAGE

2	650	G.E.	FT-559HY	440	3570
2	450	Whse.	CS-1420	2300/4150	354
1	200	G.E.	IK-17	440	580
3	200	G.E.	KT-557	440	1800
1	150	Whse.	CS-856S	440	880
1	150	Whse.	CS	440	580
1	150/75	G.E.	IK	440	600/150
2	125	Al. Ch.	ARW	2200	1750
1	125	Whse.	MS	440	485

SYNCHRONOUS

2	3500	G.E.	TS	2300	257
2	2100	G.E.	ATI	2300	360
2	1750	G.E.	ATI	2300	3600
2	2000	Whse.		2300	120
3	735	G.E.	ATI	2200/12000	600
1	450	Whse.		2200	450
2	350	G.E.	TS	2200	156

M-G Sets—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
2	2000/2400	G.E.	450	250/300	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	2000	G.E.	500	25cg 660	11000
2	2000	G.E.	514	600	6600/13200
2	1500	G.E.	514	250	6600/13200
1	1500	G.E.	720	600	6600/13200
1	1500	G.E.	600	600	4160
1	1500	C.W.	514	30/115	4000/13000
2	1000	Whse.	900	600	4160
1	1000	G.E.	900	260	4600
1	1000(3U)	G.E.	900	250	2200
1	750	Whse.	900	275	4160
1	750	C.W.	514	30/115	2300
1	600	G.E.	720	250	440/2300
1	500	G.E.	720	125	2300
1	500	Whse.	900	125/250	440
1	500	Whse.	1200	125/250	2300
1	400(3U)	Cr. Wh.	1200	125/250	2300
1	150	Whse.	1200	275	2300
1	140(3U)	Cr. Wh.	690	125/250	440/2300
1	100	G.E.	1200	250	2300/4000
1	100	G.E.	1170	125	220/410

FREQUENCY CHANGER SETS

Qu.	KW	Make	Freq.	Voltages
1	12500	Whse.	25/60	13200/13200
1	5000	G.E.	25/60	2300/2300/4000
2	2500	G.E.	25/62.5	2300/2300
1	1000	G.E.	25/58.3	4400/2300
1	500	Al. Ch.	2560	11000/2300

BELYEA COMPANY, INC.
47 Howell Street, Jersey City 6, N. J.

The Clearing House

NEWS OF USED AND REBUILT MACHINERY

Cleveland Firming . . . Pick up in rebuilding volume and increased demand from small plants has pepped up the used machinery market in Cleveland during the last month. Overall sales are down as much as 30 pct for some firms, but dealers seem to be more confident than they have been.

Larger firms are sending an increasing volume of machines to rebuilders. One company in the Cleveland area has already contracted to have $20,000 worth of rebuilding done and its program is not yet complete.

Plant superintendent of this firm told THE IRON AGE the rebuilding jobs were averaging only about one-fifth the cost of new machinery. He said high taxes and increasing need to keep costs down were the reasons his firm decided on the rebuilding program.

Have Backlog . . . Cleveland rebuilders have generally overcome their midsummer slump. Last July backlogs were negligible and most shops could contract rebuilding jobs at a moment's notice. But since the start of the fourth quarter, some rebuilders have been operating on a 48-hour week to keep up with demand. In some instances small jobs have been turned down and a healthier backlog has resulted.

Although the last quarter isn't generally a boom period, one Cleveland rebuilder says he can't promise delivery until late February or early March. Since most of this work is not related to defense, the increased activity is regarded as a hopeful sign for next year.

Small Plants Buying . . . Many small plant operators report they have made recent purchases of used jig borers, milling machines and lathes. Majority of these firms say they will continue to watch the used market before considering purchases of new equipment.

Bargain hunters, however, still aren't satisfied that used prices have come down to an attractive level despite price drops of at least 20 pct recently.

Many dealers say full market potential will not be realized until prices are pegged somewhere between 20-25 pct above the pre-Korean level. If this happens, dealers would have to settle for 60-65 pct of original value.

Can't Compete . . . Unless prices do drop to this level, machinery exporters say it will be impossible to compete for business in Germany, France, Italy and other European countries. While overseas inquiries for used U. S. machinery have been increasing, actual sales have remained low because new European equipment is still too competitive pricewise.

Many Cleveland dealers say government leasing of machine tools is still cutting into their sales. Report is defense subcontractors are continuing to take on low rental tools whenever they can.

Machinery Growth . . . Some interesting statistics which point up the growth of the machinery industry are contained in *World Population and Production*, a report recently put out by Twentieth Century Fund. The publication states that machine tool output in the U. S. during the 4 years of World War II amounted to more than 20 years' production at the prewar rate.

The article also points out that as of 1948 the machinery and transportation industries throughout the world employed 20-22 million workers, or about one-seventh of total factory labor force.

Canadians Join . . . Influence of the ever-growing Machinery Dealers National Assn. has now stretched across the border into Canada. In approving membership applications from 11 new firms earlier this month, MDNA added its first Canadian members. The new Canadian MDNA members are Miller Machinery & Supply Co., Toronto, and Silver Bros., Hamilton, Ontario.

OSBORN

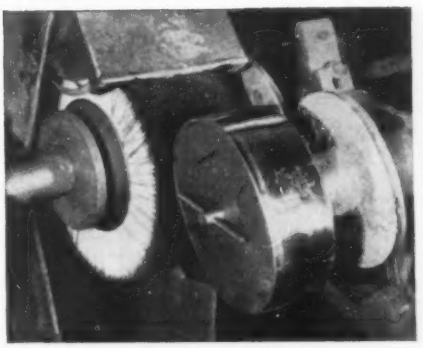
X unmarks the spot...at 1750 rpm

Heavy Presses form these waffle iron lids. But they leave draw marks on the cold rolled steel . . . marks which must be removed before the lids take their nickel plating bath.

That's when the Osborn Fascut® brushing sections go to work for this appliance manufacturer. Under those waffle-iron panels are wooden forms, attached to the table which moves the panels back and forth under the rotating (1750 rpm) Fascut brushes. A flexible back-up roll regulates the pressure during brushing.

Not only do the Fascut brushes blend away the draw marks quickly... but the panels are also finished at the same time. This eliminates a time-consuming hand-finishing operation. Now the manufacturer produces 250 panels an hour, *twice the output* before the Osborn Fascut brushing sections were adopted.

Whatever *your* product . . . metal, rubber, plastic or other material . . . it will pay you to have your **O**sborn **B**rushing **A**nalyst study your operations to suggest the money- and time-saving techniques made possible by Osborn power brushing methods. Call or write *The Osborn Manufacturing Company, Dept. F-15, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

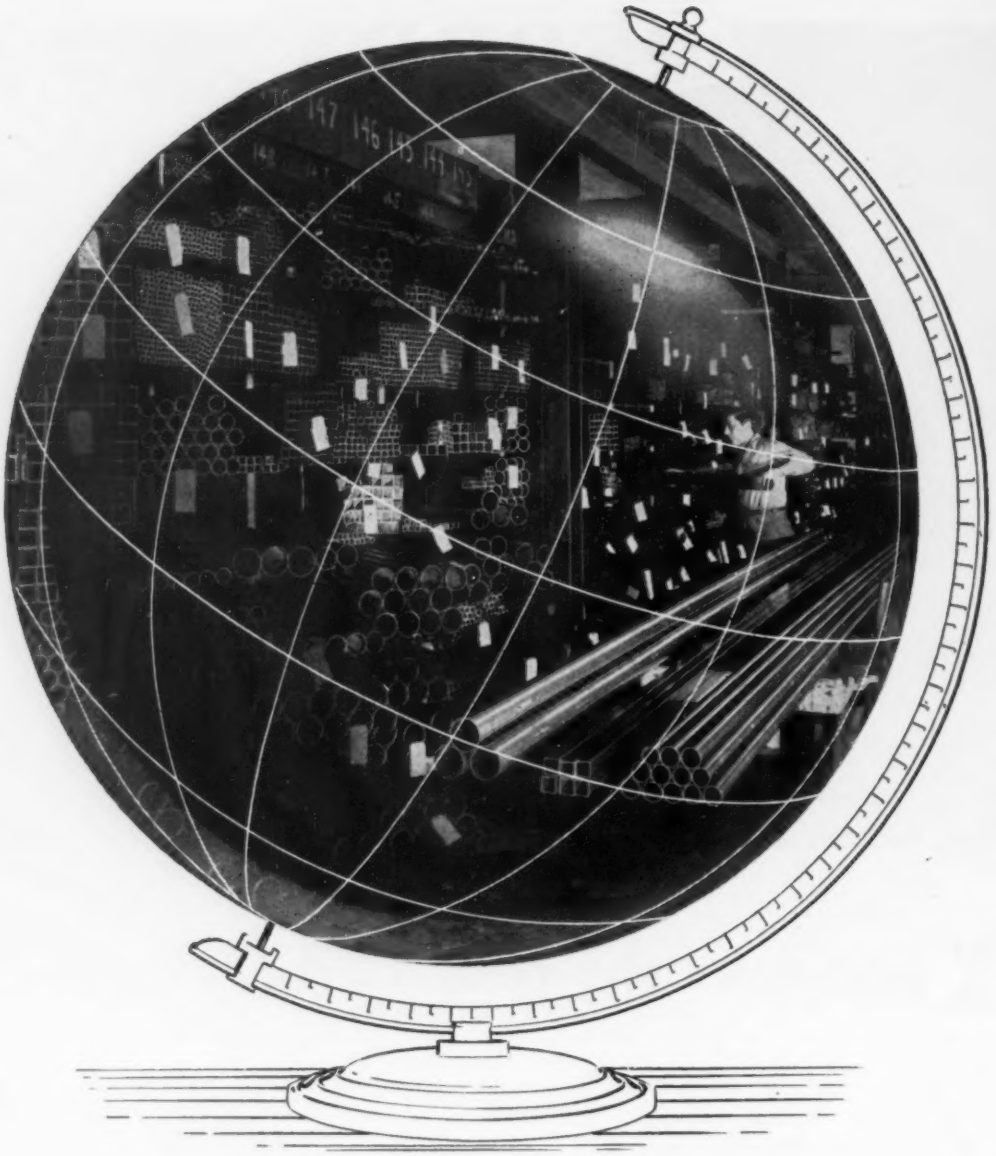


300% greater wear is obtained from the Osborn Monarch Brushes used here than with the Tampico brushes used previously. In this push-button brushing operation, a smooth lustrous finish is produced prior to nickel plating.

FREE:
New booklet on deburring with Osborn Power Brushing. Write for your copy.

Osborn Brushes

OSBORN BRUSHING METHODS • POWER, MAINTENANCE AND PAINT BRUSHES • BRUSHING MACHINES • FOUNDRY MOLDING MACHINES



Call Ryerson for Welded Tubing

WORLD'S LARGEST STOCKS

Need tubing? Whether it's one tube or a carload, you'll save time by calling your nearby Ryerson plant.

That's because Ryerson stocks of welded mechanical tubing are the world's largest, including hot and cold rolled, round and square tubes in a wide range of sizes and wall thicknesses. And each Ryerson plant—there are fifteen, from coast to coast—is set up to process your order quickly; prepare the steel to your specification and make dependable delivery.

You can depend on the quality of Ryerson welded tubing, too. Even the hot rolled has a bright finish that's particularly good for painting. Both hot and cold rolled are produced to close tolerances. On both, the welding flash has been removed.

And remember, you can also draw on Ryerson stocks for other tubing requirements and for every other steel need. So save time—call Ryerson and combine your purchases. You'll get prompt, personal attention and quick action.

PRINCIPAL PRODUCTS: CARBON, ALLOY & STAINLESS STEELS—BARS, STRUCTURALS, PLATES, SHEETS, TUBING, MACHINERY & TOOLS, ETC.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Dates to Remember

Meetings

JANUARY

ALUMINUM WINDOW MANUFACTURERS ASSN.—Winter meeting, Jan. 6-8, Saxony Hotel, Miami Beach, Fla. Association headquarters are at 74 Trinity Place, New York.

AMERICAN HOME LAUNDRY MANUFACTURERS' ASSN.—Annual meeting, Jan. 8, Morrison Hotel, Chicago. Association headquarters are at 20 N. Wacker Drive, Chicago.

TRUCK - TRAILER MANUFACTURERS ASSN., INC.—Annual convention, Jan. 11-13, Boca Raton Club, Boca Raton, Fla. Association headquarters are at National Press Bldg., Washington.

SOCIETY OF AUTOMOTIVE ENGINEERS—Annual meeting and Engineering Display, Jan. 11-15, Sheraton-Cadillac and Statler Hotels, Detroit. Society headquarters are at 29 W. 39th St., New York.

NATIONAL CONSTRUCTORS ASSN.—Annual meeting, Jan. 12-14, Commodore Hotel, New York. Association headquarters are at 50 E. 41st St., New York.

AMERICAN BOILER MANUFACTURERS ASSN. & AFFILIATED INDUSTRIES—Mid-winter meeting, Jan. 13, Cleveland Hotel, Cleveland. Association headquarters are at 1571 W. 117th St., Cleveland.

INSTITUTE OF SCRAP IRON & STEEL, INC.—Annual convention, Jan. 17-19, Statler Hotel, Washington. Institute headquarters are at 1729 H St., N.W., Washington.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS — Winter meeting, Jan. 18-22, Statler Hotel, New York. Institute headquarters are at 33 W. 39th St., New York.

STEEL SHIPPING CONTAINER INSTITUTE, INC.—Winter meeting, Jan. 20-21, Pierre Hotel, Hampshire House, New York. Institute headquarters are at 600 Fifth Ave., New York.

THE ALUMINUM ASSN.—Annual meeting, Jan. 21, New York. Association headquarters are at 420 Lexington Ave., New York.

ELECTRIC TOOL INSTITUTE — Annual meeting, Jan. 21, Edgewater Beach Hotel, Chicago. Institute headquarters are at 813 Clark Bldg., Pittsburgh.

STEEL PLATE FABRICATORS ASSN.—Annual meeting, Jan. 21-22, Palmer House, Chicago. Association headquarters are at 37 W. Van Buren St., Chicago.

FOR THE VERY BEST
See ATLAS

TRANSFERS - SCALE CARS
COAL CHARGERS - COKE QUENCHERS

50-TON GABLE BOTTOM ORE TRANSFER

Car is equipped with hydraulically operated discharge gates and brakes, and is provided with steel plate trucks. The operator's cab is overhung at one side to give the operator a line of vision alongside the car. The car is equipped with electric space heaters.

ENGINEERS AND MANUFACTURERS
THE ATLAS CAR & MFG. CO.
1100 IVANHOE ROAD • CLEVELAND 10, OHIO

The Singer Class 253 high-speed, two-thread, chain-stitch industrial sewing machine operates at speeds up to 5,500 stitches per minute. It is used by manufacturers of shirts, bathing suits, blankets, uniforms, coats, flags, etc.

SINGER

MEETS LOW POROSITY CASTING REQUIREMENT WITH CHATEAUGAY PIG IRON

Low porosity is an important requirement in the arm casting for the Class 253 industrial sewing machine manufactured by The Singer Manufacturing Company. The machine is equipped with a fully automatic lubrication system that pumps oil under pressure to principal bearings. The inside of the casting is constantly bathed in oil which would soak through a casting of higher porosity.

To get a dense, strong casting with low porosity and high wear resistance the Singer Company uses Chateaugay, Republic's exclusive premium Pig Iron in their cupola mixture. Chateaugay shrinks evenly, fills adjoining light and heavy sections completely, produces an unusually fine and uniform grain structure. Chateaugay castings machine readily and economically.

A Republic Pig Iron Metallurgist will be glad to give you the complete story on Chateaugay, the low phosphorus, copper-free Pig Iron. There's no cost or obligation for his services.

Let us know when you would like him to call.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
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Republic **PIG IRON**

"CHATEAUGAY" Low-Phosphorus, Copper-Free

"REPUBLIC" (Northern) Foundry, Basic and Malleable

"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

Production Pointers from GISHOLT

GISHOLT

TIME-SAVING IDEAS

Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

GETTING MORE WORK PER CHUCKING WITH C/F TURRET LATHE

Only One Tool Change Required for Variety of Sizes with Expert Setup

This producer's problem was one of *sizes*. How to get fast operation on chuck bodies in a variety of sizes with minimum possible tooling and changeover.

The solution is smart . . . and noteworthy. A Gisholt 1L Cross Feeding Saddle Type Turret Lathe was selected for the job. This was equipped with a 15" 3-jaw air chuck. This not only kept chucking time low, but also, by the use of adjustable serrated jaw bases, just one set of jaws sufficed for operation 1 to handle the numerous sizes of workpieces.

The quick indexing square turret on the cross slide has tools for turning, facing, chamfering, etc. These work simultaneously with tools from the hexagon turret, a time saver on any job.

Cross Feeding Turret Speeds Job

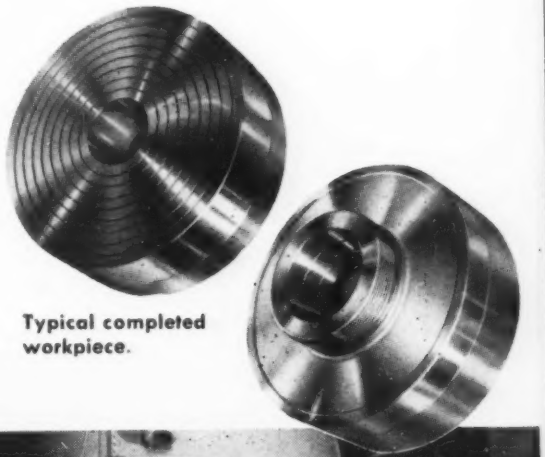
The hexagon turret is equipped with three stub boring bars for boring, counterboring, recessing or back facing. Size is set with the cross feeding turret; therefore, these same boring bars are used on many sizes of parts.

Also carried on the hexagon turret are two box-type tool posts. These are used for facing, boring or recessing. Again, because of the cross feeding hexagon turret, they are used for workpieces of various sizes.

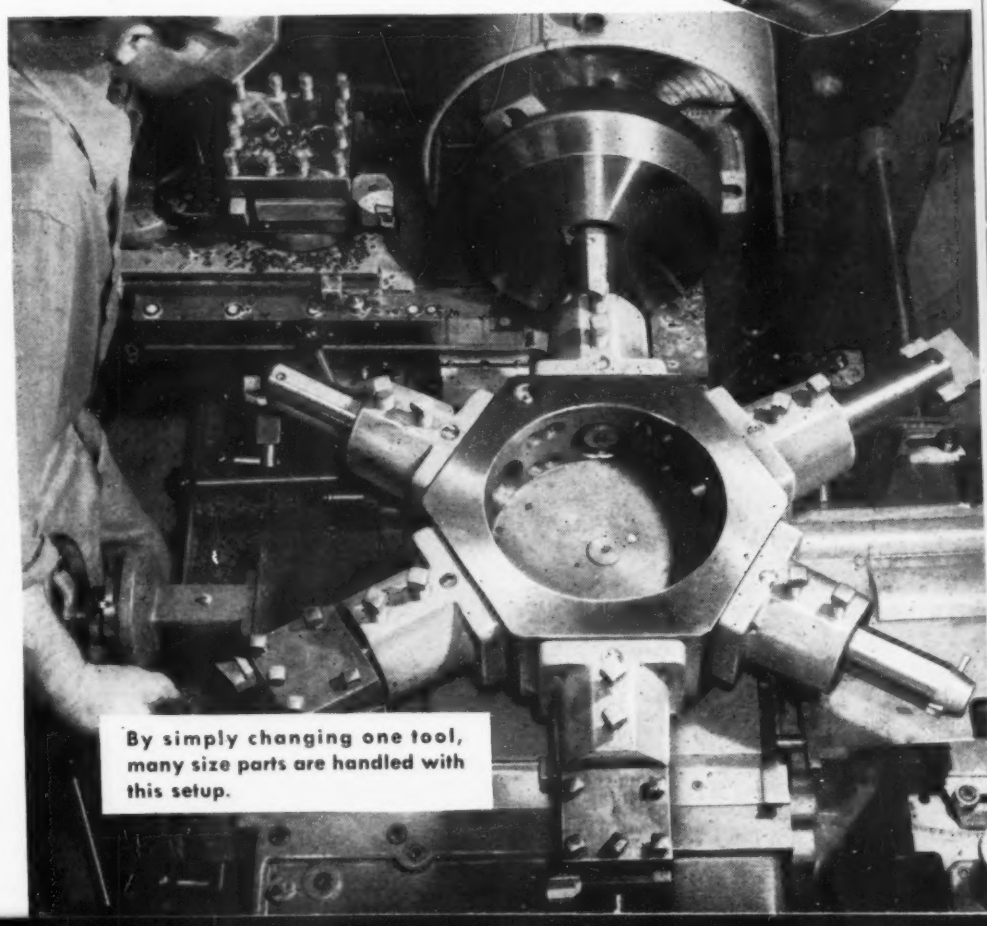
The sixth tool on the hexagon turret is a spade cutter for final sizing. This is the only tool special for each job. A quick change of this single tool readies the machine for the next job. This high production Saddle Type Turret Lathe has two additional attachments for even greater versatility. A threading attachment permits threading the hub when required. A taper attachment offers tapers up to 8 inches per foot for a wide variety of diameters.

This job shows again how you generally can do more work with fewer tools. When you specify a cross feeding turret lathe, Gisholt's 66-year experience can help you.

Simple tooling, combined with the time-saving cross feeding hexagon turret, give maximum efficiency in handling parts of various sizes.



Typical completed workpiece.



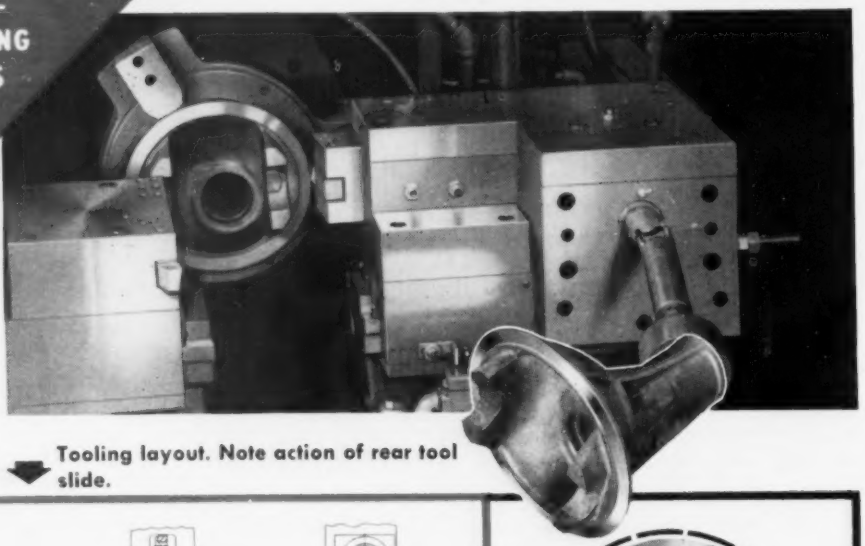
By simply changing one tool, many size parts are handled with this setup.

GISHOLT

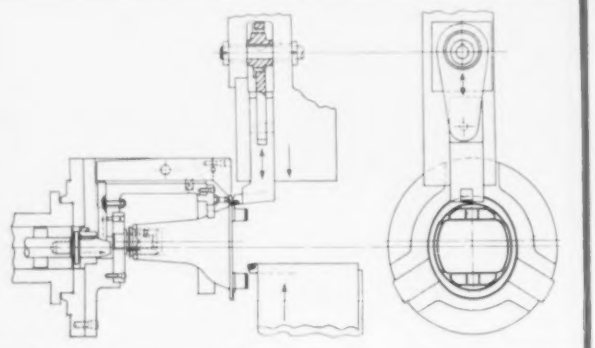
TIME-SAVING IDEAS

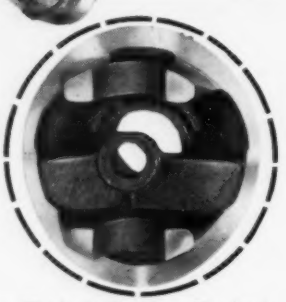
ELLIPTICAL MACHINING MADE EASY

Standard Simplimatics Solve Special Problem



Tooling layout. Note action of rear tool slide.





Circle indicates elliptical shape of workpiece.

An elliptical diameter was the stickler here. How to machine the oval shape . . . and do it on a standard machine and do it automatically?

The answer, this manufacturer found, was with the 3D Simplimatic Automatic Lathe. To do the elliptical pilot diameter on this differential carrier, a standard machine is used. Only a special cam-operated auxiliary tool, slide mounted on the standard rear slide, is required. This does both facing and turning and moves in and out two times each spindle revolution, generating the elliptical shape. When conventional facing and turning are called for, this slide is simply locked in position.

The standard front slide can be used for either facing or turning the bearing pads, merely by re-positioning at a 90° angle. Time for this part is 1.75 min. and one operator easily handles two identical machines for all production needed. Four different carriers are handled with simple changeover.

The simple addition of a special reciprocating tool slide equips standard Simplimatics for fast, automatic production of elliptical parts.

For complete picture reports on this and 30 other interesting jobs, write for new Simplimatic catalog.

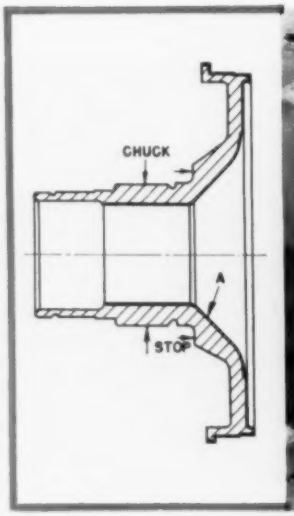
NOVEL SETUP FOR STEEP BORING

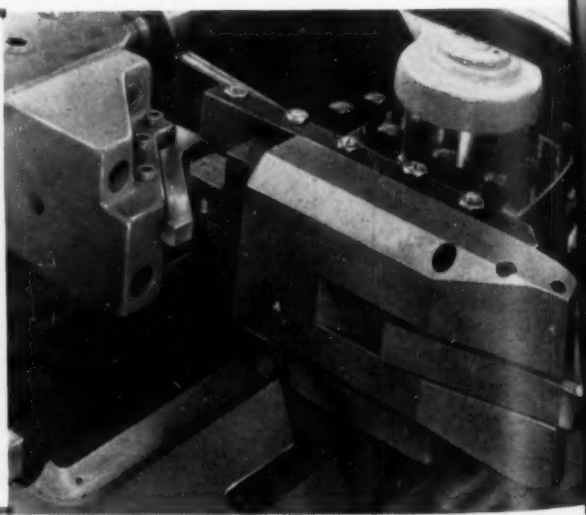
This Idea Pays Off on Ram Type Turret Lathe Job

The next time you are faced with generating a steep bore similar to this, remember this production pointer.

The problem surface (see A in drawing) combines a face, radius and a 45° angular bore. Using a standard Gisholt No. 4 Ram Type Turret Lathe, a special cam is mounted on one face of the hexagon turret. On the square turret is a special spring-loaded roller slide. Here's how it's done:

Both the hexagon turret and square turret carriage are brought into position and locked. The cross slide carrying the square turret is then fed forward. As the roller on the slide tool engages the cam, the tool bit generates the interior surfaces shown. From start to finish, the job is simple. All other tooling is standard. Thus, you can handle this job—or a variety of others—quickly, economically, with very reasonable tooling costs.





The complicated interior of these rotors are generated with repetitive accuracy by the cam-guided slide tool in the square turret.

Note how sliding tool on square turret is guided by cam on hexagon turret.

GISHOLT

TIME-SAVING IDEAS

SHELL PRODUCTION...ON THE DOUBLE

No. 12 Hydraulic Lathes Enlisted for Speedy Operation

Speed was the No. 1 requirement here ... in centering and cut-off operations on 75mm. and 105mm. shells.

Here's how two different plants are pushing production using identical setups on No. 12 Hydraulic Automatic Lathes: The forgings are located from the bottom of the cavity on a mandrel and held by two sets of air-operated expanding fingers.

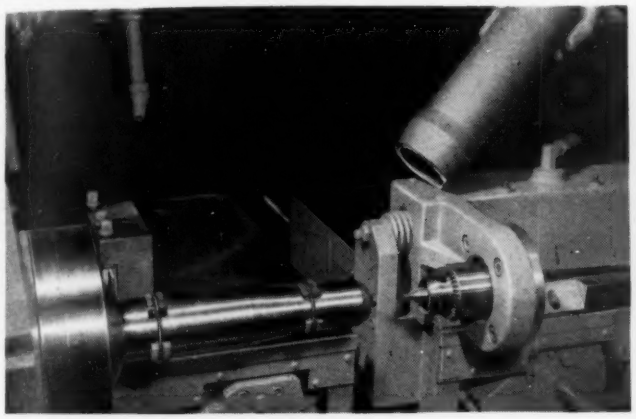
The left rear slide carries a tool block with a single tool for cut-off to length. The right slide carries an auxiliary slide on which is mounted a speeder with a center drill. The main slide moves back at the end of the cycle to clear the work for unloading.

Floor-to-floor time on the 75mm. shell (photo A) is about 0.6 minutes. Time for the 105mm. shell (photo B) is approximately 0.8 minutes. In both cases, the operators have ample time to handle two or more machines because of the automatic cycle.

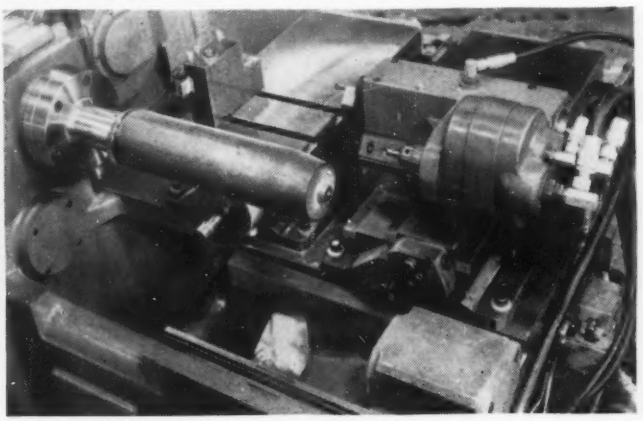
In this first machining operation, shells are faced to length . . . open end is squared . . . and proper center is established—all handled automatically, quickly and economically.

A complete catalog on the No. 12 Hydraulic Lathe is available.

(A) Close-up of No. 12 Hydraulic Automatic Lathe for work on 75mm. shell shown.



(B) Time for this 105mm. shell is 0.8 minutes.



4-MACHINE SETUP MAKES FAST WORK OF THIN-WALL PARTS

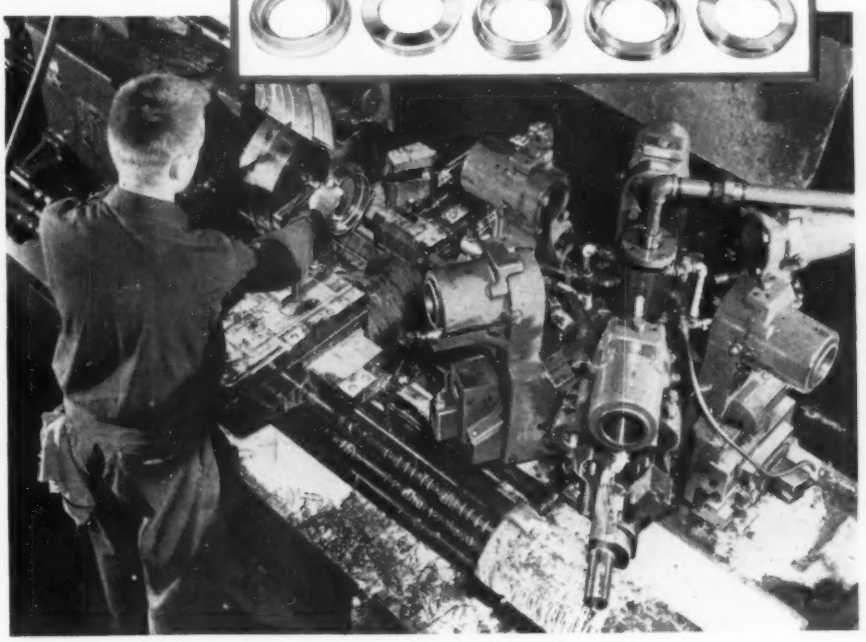
Costs are Low with one man and four Fastermatic Automatic Turret Lathes

This problem was one of accurately producing parts which require considerable stock removal, leaving them thin and frail. This precludes taking off too much metal at one time. Also, heavy chucking pressure has to be avoided to prevent distortion.

The only practical way to do it is by spreading the work over a series of relatively light cuts and doing the job automatically to keep costs low. The Fastermatic Automatic Turret Lathe, therefore, was the logical solution—with four machines handling all operations. All machines can be handled by one man since total labor time is six minutes per piece. The .004" tolerance demanded by the thin-wall section is easily met because of the Fastermatic's automatic cycle and the elimination of human error.

These thin-wall parts are accurately and economically produced by a sequence of light cuts with four Fastermatics and one man.

Rough part and after each of four operations.



Setup on one of four Fastermatics doing this job.

GISHOLT

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TIME-SAVING IDEAS

HOW BALANCING PROTECTS THIS VITAL AIRCRAFT ASSEMBLY

Required Correction Shown by Direct Readings

Vibration means trouble for aircraft cabin superchargers. To insure smooth, dependable operation at high rotating speeds is this Type 13S Gisholt DYNETRIC Balancing Machine.

This 6-lb. assembly is supported in a cradle, rotated at 2300 r.p.m. and the amount and location of unbalance in each plane recorded. Stock is then ground off until a recheck indicates that the tolerance of .424 gram-inches has been met.

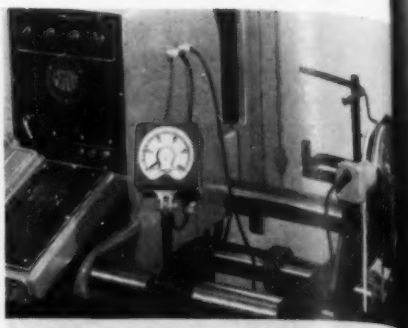
Each scale unit on the machine's direct-reading amount meter represents .1 gram-inch of unbalance. Therefore, the operator need balance to only 4.24 scale units on the meter to be within the prescribed tolerance for each correction plane. The extreme sensitivity of the machine with dial readings which provide an amplification of unbalance effect, permits greater ease and handling speed.

Whether unbalance is read in terms of stock to be removed or length of material to be added, ease of calibration is just one important feature of Gisholt Balancers.

Unbalance in terms of gram-inches is quickly measured by this Balancer with correction made by grinding off metal.

DYNETRIC BALANCERS GISHOLT

DEVELOPED JOINTLY WITH WESTINGHOUSE ELECTRIC CORPORATION
"DYNETRIC" IS A TRADE MARK REG. U. S. PAT. OFFICE BY WESTINGHOUSE ELECTRIC CORPORATION



Simple to operate, this Balancer gives fast, accurate unbalance readings in gram-inches.

Production Balancing

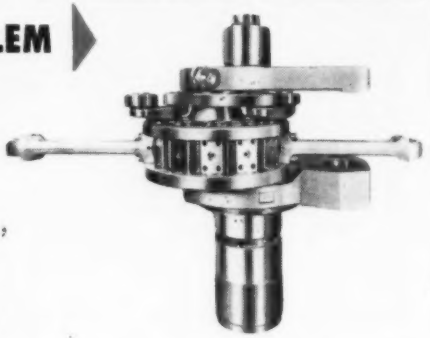
. . . is one of the many helpful subjects fully covered in the Gisholt Balancing School—only service of its kind available to industry. Write for details and starting dates . . . four classes scheduled for January and February.

SIMPLE SOLUTION TO SPECIAL CRANKSHAFT PROBLEM

Nordberg Shows How Big Job is Handled At Small Investment with Superfinishing

Superfinishing large bearing surface by means of attachment to boring mill.

No. 11-1253
614



Like many others, Nordberg Manufacturing Company solved an otherwise difficult problem through the simple expedient of Superfinishing. Extra-long bearing life is assured because Superfinish takes these critical surfaces down to base metal, removing the soft, annealed "smear metal" left by grinding heat.

The crankshafts in Nordberg Radial Engines have a *single* throw and require only two main bearings. With the force of 2125 h.p. acting on these bearings, as in the case of a 12-cyl. model, you can see the need for an accurately controlled bearing surface.

This is done at extremely low cost, both in equipment investment and in time—because of the adaptability of this modern process. Using existing equipment, a No. 3 Superfinishing Attachment is mounted in a standard tool head of a vertical boring mill. The workpiece is clamped to the rotary table in the usual manner, completing the simple setup.

Superfinishing is satisfactorily accomplished with on-hand equipment . . . without the expense of a special machine for this operation.

See how the basic advantages of Superfinishing—better, longer-wearing surfaces that cost less—can be applied to your problems. The textbook, "Wear and Surface Finish," reports fully on Superfinishing: ask for it.

With a low-cost attachment for existing equipment, these very large bearings get better, longer-lasting surfaces through Superfinishing.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT

Write for your copy of Gisholt's new general catalog.

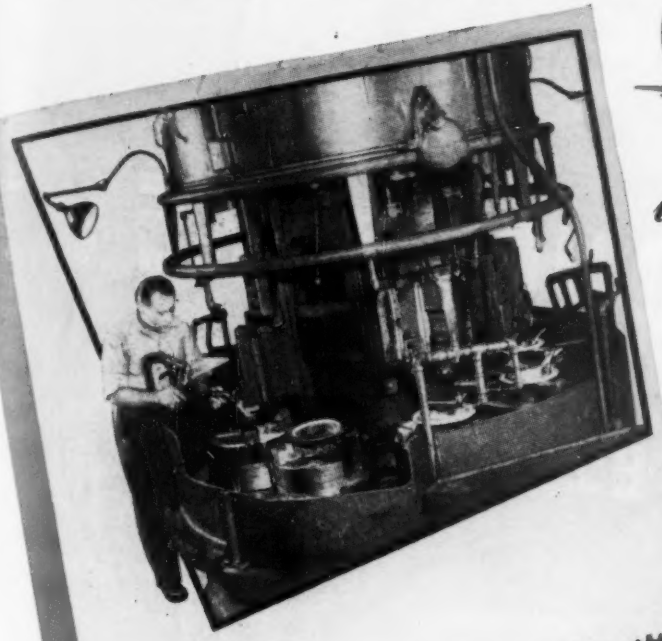
GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

. . . a customer speaks with

CONFIDENCE

in his manufacturing equipment



Quantity Production . . .

• Quantity production of identical gears offers a challenge that we here at BRAD FOOTE are eager to accept.

• Multiple spindle machines, duplicate machines, numerous and varied machines, every machine that's needed—PLUS men of long experience making close tolerance gears . . . these factors make it possible for us to confidently accept such a challenge.

• When you specify BRAD FOOTE gears, you do so with the knowledge that each gear will be made to exact specifications; that every gear of a quantity will be identical in structure, in size, and in appearance; that each operation on every gear will be performed by BRAD FOOTE people in BRAD FOOTE shops. No one will share our responsibility.

• You will be satisfied with the BRAD FOOTE gears you buy because they will give long, economical service on the ea... you operate, or on the machines you sell.

• Your inquiries ... invited.

BULLARD
Mult-Au-Matics

have earned this confidence in many plants.

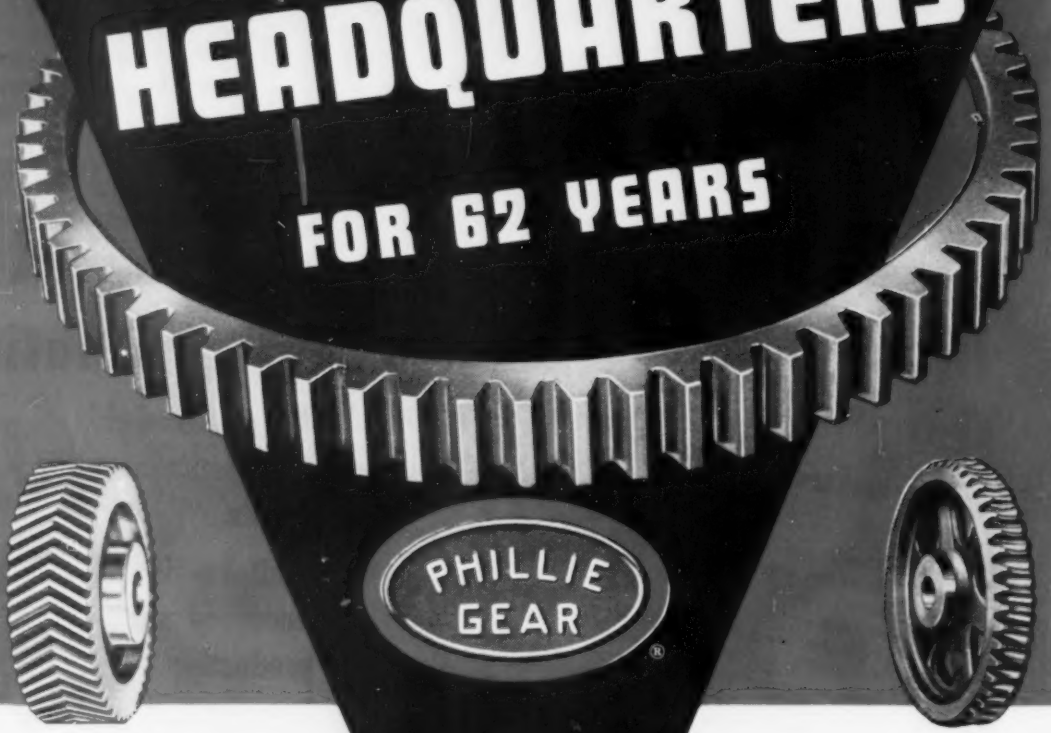
Mult-Au-Matic accuracy and efficient production are key notes from satisfied users.

Where others profit from Mult-Au-Matic installations, you too can benefit. Ask Bullard for surveys on your work.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

GEAR HEADQUARTERS FOR 62 YEARS



Continuous Tooth Herringbones up to 60" diameter. Separated Tooth Gears up to 150" diameter.

Worm Gears up to 150" diameter. Worms to match.

SPUR, HELICAL, SPUR INTERNAL, HELICAL INTERNAL, RACK, HERRINGBONE, WORM, NON-METALLIC

SPLINES, CONIFLEX BEVEL, SPIRAL BEVEL, ZEROL, HYPOID, INTERMITTENT SPROCKETS

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

FREE PUBLICATIONS

These publications describe money - saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Tungsten carbide

Advantages of cemented tungsten carbide for balls and seats in subsurface pumps employed in the petroleum industry are described in recent bulletin. The publication includes information on the abrasion, corrosion and impact resistance of the carbide in addition to its composition and manufacture. *Carboloy Dept. of General Electric Co.*

For free copy circle No. 1 on postcard.

Building materials

J-M Products for the Process Industries is title of a new 8-p. catalog issued by Johns-Manville. It gives concise data on the properties of the various products and includes photographs which show typical installations. It is arranged as a ready reference for men who design, install and operate process equipment. *Johns-Manville.*

For free copy circle No. 2 on postcard.

Hydraulic components

To simplify planning of hydraulic circuits and ordering of hydraulic components, Hydraulic Press Mfg. Co. has produced set of nine catalogs on its new components line. They are designed to simplify planning, specifying and ordering of hydraulic components. Included on each page is all the basic data the engineer needs on each individual product. Each catalog features visual index showing photo of the product and page where specifications are to be found. Large cutaway views show construction features and clearly identify parts for ordering replacements. Catalogs classify line as to type, style, product and pressure range. *Hydraulic Press Mfg. Co.*

For free copy circle No. 3 on postcard.

Lift truck

New 8-p. illustrated catalog on the Hyster YT-40 lift truck is now available. The YT-40 is a 4000-lb capacity model featuring trunnion-mounted steering and pneumatic tires. It is an all-purpose, inside-outside truck. Complete description and specifications are included. *Hyster Co.*

For free copy circle No. 4 on postcard.

Gloves

Complete description of Jomac work gloves is available in new catalog. Many of the numerous styles are listed and photos are shown of each series, including heat and flame resistant gloves, glov-safers and special hand pads and sleeves. *C. Walker Jones Co.*

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Turn Page

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No postage necessary if mailed in the United States

POSTAGE WILL BE PAID BY

THE IRON AGE
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Free Publications

Continued

Tubing and pipe

Engineers in the oil refining and power industries and other fields such as chemical, dye, paper, pulp, beverage, dairy and food processing industries who are associated with the design of equipment operating at elevated temperatures or pressures will be interested in new data folder prepared by Tubular Products Div. of the Babcock & Wilcox Co. Folder presents condensed technical data on 14 tubing steels used in high-temperature or high-pressure service. Data on analyses, mechanical and physical properties, creep strength, short-time elevated temperature tensile properties and oxidation resistance is presented on a complete series of tubing steels. *Tubular Products Div.*

For free copy circle No. 6 on postcard.

More Literature Available

Many companies offer free literature and other information in their advertisements. For the name of these firms see the company listings in the index of advertisers.

Strain indicator

New bulletin describes newly improved SR-4 portable strain indicator, Type MA, with self-contained a.c. power pack mounted inside the instrument case. *Baldwin-Lima-Hamilton Corp.*

For free copy circle No. 7 on postcard.

Lubrication

Comparisons of methods for lubricating electric motors are depicted in new bulletin just issued by U. S. Electrical Motors, Inc. The bulletin illustrates three principal types of bearings used in motors, cartridge, standard open and Lubriflush types, with explanations of the function of each. For demonstrating the action of relubrication in the U. S. Lubriflush bearings, series of natural color photos of a transparent bearing housing is reproduced. Proof that any motor bearing breathes air and therefore leads to contamination of the bearing is demonstrated photographically. *U. S. Electrical Motors, Inc.*

For free copy circle No. 8 on postcard.

Hydraulic oils

Recommendations for hydraulic oil selection and basic hydraulic system maintenance on machine tools and other industrial machinery is offered in recent bulletin available from Vickers, Inc. *Hydraulics for Industrial Machinery* reviews important characteristics of hydraulic oils, hydraulic system operation under normal and extreme temperature and humidity conditions, and general maintenance procedures for Vickers complete line of industrial hydraulic equipment. Table of common hydraulic system difficulties and corrective action for each is included. *Vickers, Inc.*

For free copy circle No. 9 on postcard.

Tangent bending

This new catalog describes the important process of Tangent Bending, which has made rapid progress in the last few years. Tangent Bending is a forming process used in metal cabinet making and has a technique all its own. The 28-p. two-color catalog, just off the press, shows many domestic and industrial applications of this increasingly important phase of metal working. Four types of Tangent Bending Sequence Presses are shown. The production speed of the fastest runs as high as 300 parts per hour. *Cyril Bath Co.*

For free copy circle No. 10 on postcard.

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Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 12/31/53

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BUSINESS REPLY CARD
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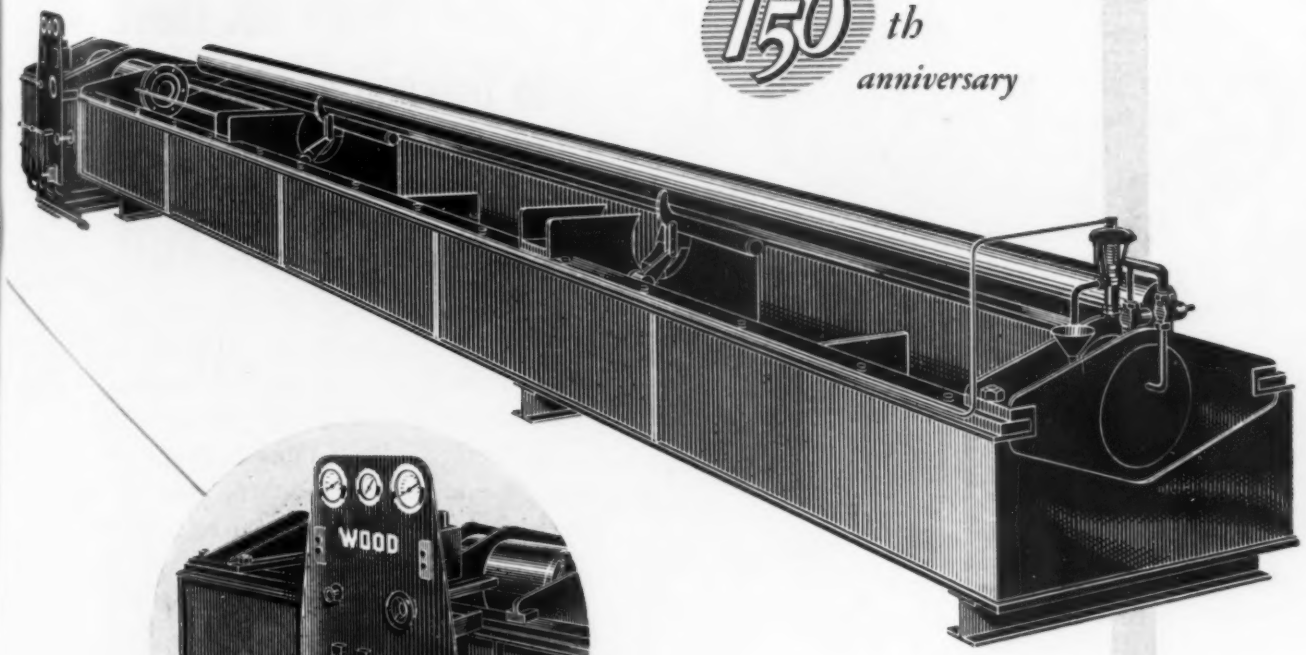
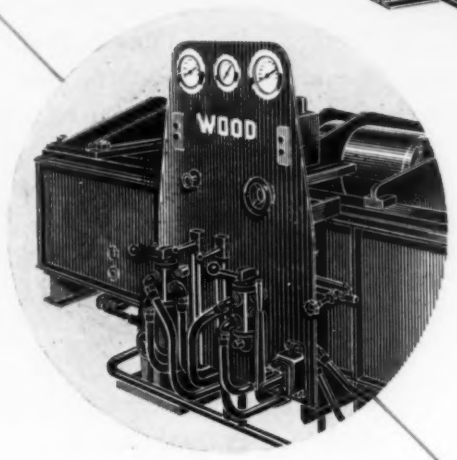
150th anniversary





Hydrostatic Tube Testing Machine designed for the hydrostatic testing of tubes of 4½" to 12" nominal sizes and in maximum lengths of 35'. Test pressures range from 700 to 1500 psi. *Write for catalogs of our hydraulic equipment.*

R. D. Wood Hydrostatic Tube Tester

"... that industrial equipment which has maintained high excellence in manufacture will continue to be sold, and will contribute its worth to uplifting the general quality of everything produced in industrial America ..."

R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.

WOOD

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

From flat sheet to finished product . . . THE ZINC COATING ON INLAND TI-CO® STAYS PUT!

Nine operations to make this muffler cap from Inland's Ti-Co galvanized steel sheets . . . nine chances for the protective zinc coating to crack, flake or peel. But Ti-Co passes each test. Its tight zinc coating actually stretches and flows with the base metal as it's blanked, put through five successive draws, trimmed, pierced, flanged, re-formed and finally expanded to size. No need for dipping or touching up . . . the coating on the finished product remains tight and uniform from flat Ti-Co drawing quality sheet to finished product.

Ti-Co is continuously annealed and galvanized by the patented Sendzimir process, which eliminates the brittle iron-zinc layer found in ordinary galvanized sheets. This flexible, uniform coating means Ti-Co galvanized products are easier and cheaper to produce, and stay serviceable and good-looking longer.

Because of the terrific demand for this superior quality sheet, you may sometimes find Ti-Co difficult to obtain on short order. But please bear with us. We're doubling our capacity during 1954 to help assure plenty of Ti-Co for everyone. Ti-Co is worth waiting for!

To get the whole story . . .

Write for our new Ti-Co catalog. It tells how Ti-Co can help you produce better galvanized products for less—and turn out new products not practical with ordinary galvanized sheets or other metals

INLAND STEEL COMPANY
Dept. T-1, 38 South Dearborn Street
Chicago 3, Illinois
Sales Offices: Chicago, Milwaukee, St. Paul, St. Louis, Davenport, Kansas City, Indianapolis, Detroit and New York

INLAND **TI-CO®** GALVANIZED SHEETS WITH THE ZINC COATING THAT ROLLS WITH THE PUNCH

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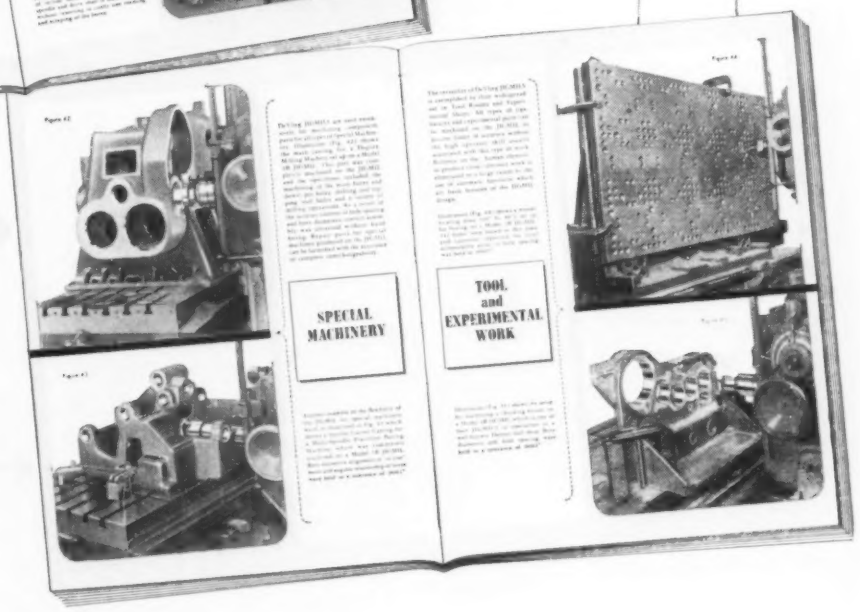


A request on your company letterhead will bring a free copy of this catalog!

for the latest developments in precision boring equipment . . . consult

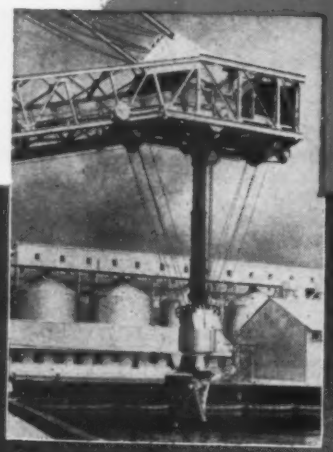
DEVLIEG OF DETROIT

DE VLIEG MACHINE COMPANY 450 Fair Avenue, Ferndale, Detroit 20, Michigan

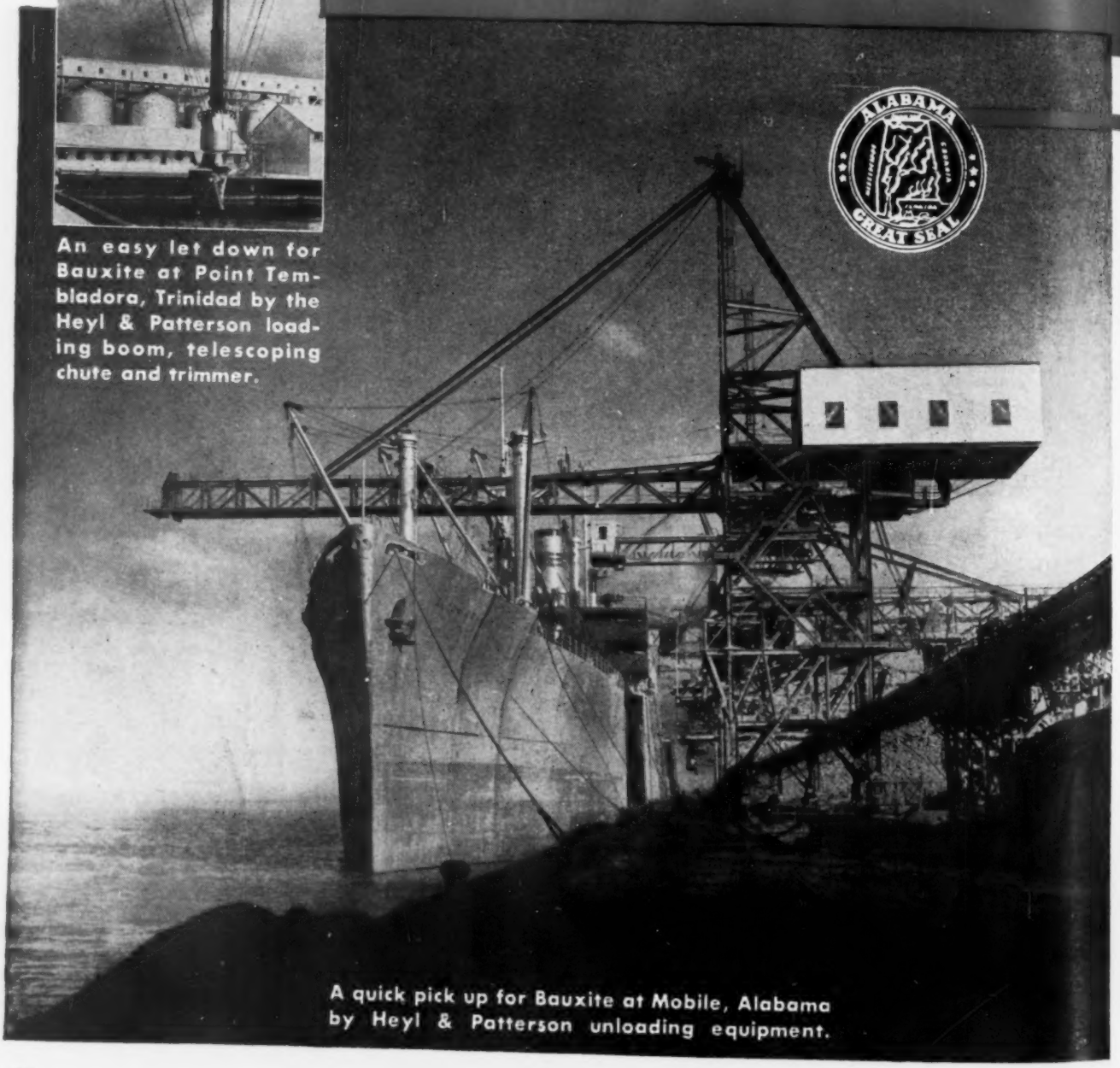
The Unloading, Loading and Conveying Equipment at Alcoa Steamship Company's Bauxite Ore Transfer Station, Point Tembladora, Trinidad, was designed and built by Heyl & Patterson.

HEYL & PATTERSON

Loading and Unloading Equipment



An easy let down for Bauxite at Point Tembladora, Trinidad by the Heyl & Patterson loading boom, telescoping chute and trimmer.



A quick pick up for Bauxite at Mobile, Alabama by Heyl & Patterson unloading equipment.

IN TRINIDAD . . . At Point Tembladora, Trinidad stands the huge Bauxite Ore Transfer Station of the Alcoa Steamship Company. Here bauxite ore is unloaded from river ships by two Heyl & Patterson Unloaders, and carried by Heyl & Patterson conveying equipment either to the storage bins or directly to the Heyl & Patterson loading facilities where the ore is deposited into the holds of ocean-going vessels.

The H & P telescoping loading chute is especially designed to lower the bauxite ore gently and quickly into the hold of the vessel at the rate of 2000 tons per hour with a minimum amount of dust.

landles Bauxite Quickly and Easily at oth ends of its Caribbean Voyage

IN ALABAMA . . . At the Alabama State Docks, Mobile, Alabama . . . the Ship, loaded with Bauxite Ore from Trinidad, docks alongside of the new Heyl & Patterson Traveling Unloading Tower. The bauxite is rapidly unloaded from the ship and deposited onto a belt conveyor for its first step to the processing plant.

This modern 800-tons-per-hour Unloader . . . designed, fabricated and erected for the State of Alabama . . . currently unloads iron ore and manganese ore as well as bauxite.

The special features of this unloading tower illustrate how it was designed to fit operating conditions at Mobile and why it is one of the finest unloaders in operation today.

(1) The Tower is equipped with an extra-long cantilever which enables material to be transferred from the ship either to the conveyor system or directly to a river barge. In the latter operation the barge is positioned at the opposite side of the ship from the Tower and the trolley moves from above the ship to the extreme end of the cantilever to load the barge.

(2) Because of the short rail spacing between the trucks, the machinery house is placed far to the rear of the tower to counter-balance the weight of the extra-long cantilever.

(3) Adjustable voltage electrical control is used to provide smooth starting and stopping and the fastest possible operation. The use of adjustable voltage lowers maintenance costs and reduces power losses.

(4) The filtered air in the machinery house is kept constantly at a higher pressure than the outside air. This prevents infiltration of dust and prevents overheating of equipment.

(5) The operator's cab is mounted on a heavy ram and moves out over the hold of the vessel when unloading. This enables the operator to have a full view of the hold at all times.

(6) Each bucket of ore can be weighed by means of a force cell application which indicates the bucket weight in the operator's cab.

Heyl & Patterson has never designed or built "catalog" loading or unloading equipment. Every Heyl & Patterson installation is especially engineered to meet the particular needs of the customer.

For *YOUR* loading or unloading problem, investigate the advantages of having your installation designed, fabricated and erected by Heyl & Patterson.

Heavy Bulk Materials Handling Equipment *All The Way from Design to Erection*

Boat Loaders and Unloaders
Ore Bridges
High Lift-Turnover-Rotary
Railroad Car Dumpers
Coal Handling Equipment
Pig Iron Casting Machines
Cyclone Thickeners
Thorsten Coal Samplers
Car Hauls and Boat Movers
Coal Crushers
Bradford Breakers

Heyl & Patterson, Inc.
"SINCE 1887"
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In this new publication you'll find photos and descriptions of typical installations, cut-away views of the furnaces, description of the control instruments, and complete specifications for various sizes of furnaces, work baskets and trays.

Brand New Tempering Ideas!

As you're reading this ad our entirely new 20-page catalog will be just off press. It tells graphically of some of the remarkable operating results being obtained in hundreds of plants by users of Homo furnaces.

Today, Homo furnaces are being used under practically every kind of operating condition . . . to meet practically every kind of specification . . . on practically every type of work . . . steel, aluminum or glass. There's a wealth of first-hand data available to you.

If your plant does tempering, at any stage of production, we believe you'll be interested in this up-to-date information about the highly versatile Homo method . . . the five kinds of Homo furnaces and the jobs they're built to do.

We'll send your copy as soon as you request it. Just write our nearest office or 4956 Stenton Ave., Philadelphia 44, Pa. and ask for Catalog TD2-625(1).

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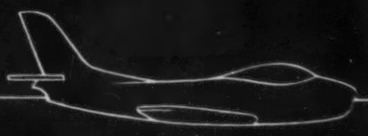

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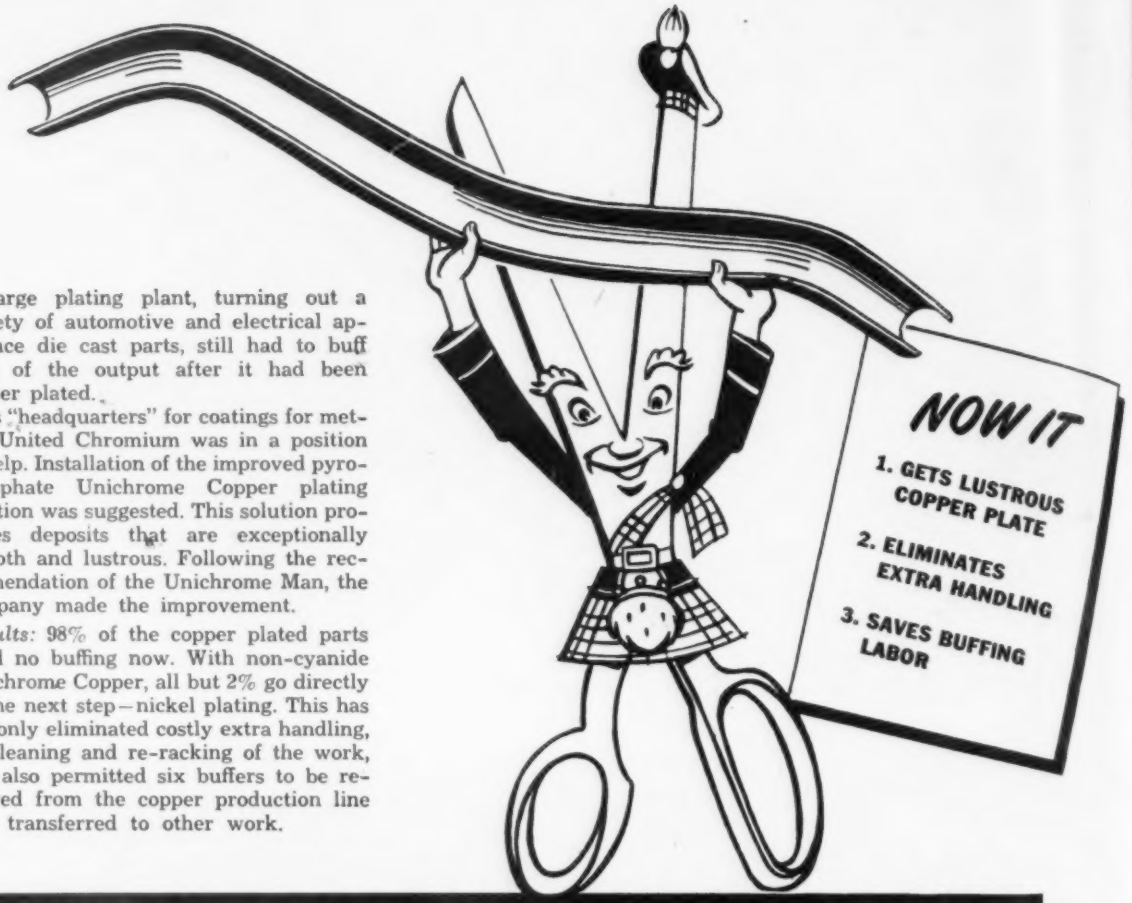
MR. COST CUTTER SHOWS HOW

plating change cut copper polishing 95%



A large plating plant, turning out a variety of automotive and electrical appliance die cast parts, still had to buff 40% of the output after it had been copper plated.

As "headquarters" for coatings for metals, United Chromium was in a position to help. Installation of the improved pyrophosphate Unichrome Copper plating solution was suggested. This solution produces deposits that are exceptionally smooth and lustrous. Following the recommendation of the Unichrome Man, the company made the improvement.

Results: 98% of the copper plated parts need no buffing now. With non-cyanide Unichrome Copper, all but 2% go directly to the next step—nickel plating. This has not only eliminated costly extra handling, re-cleaning and re-racking of the work, but also permitted six buffers to be removed from the copper production line and transferred to other work.

MORE WAYS UNITED CHROMIUM HELPS CUT COST OF COATING METALS

Cuts corrosion costs

Reports show: Interior of brine tanks still protected 5 years after application of Ucilon* Protective Coatings; . . . 5 years' service also obtained against hydrochloric acid fumes with virtually no patchwork needed; even after 3 years, no failure seen in Ucilon Coatings on steel submerged in sewage. *Trade Mark

Save with the right zinc finish

With its electrolytic and chemical dip processes, United Chromium offers the most complete line of protective chromate finishes for zinc available. This wide choice results in substantial benefits because it means a finish not "almost as good as" but rather the one that best meets the user's needs.

Organic coating for extra service

When battling corrosive liquids and fumes, vinyl Unichrome Plastisol Compounds provide coatings so thick and tough, they can be depended on not to break down or wear through. They often permit economical use of ordinary metals in place of costly alloys.

TO FINISH IT BETTER AND SAVE

call in "The Unichrome Man"

UNICHROME

Trade Mark

It pays to consult United Chromium on Metal Finishing Problems

United Chromium offers you the advantages of: (1) 25 years of specialized experience in metal finishing; (2) Wide experience in *both* organic and plated finishes; (3) A diversified line of products for decorative and functional finishing – including plating processes, protective coatings, chemical conversion coatings for zinc; (4) Thinking geared to *cost-cutting, product-improving* possibilities.

We'd welcome an opportunity to help you "Finish it better AND SAVE."

UNITED CHROMIUM, INCORPORATED 100 East 42nd St., New York 17, N. Y.

Waterbury 20, Conn. • Detroit 20, Mich. • Chicago 4, Ill. • Los Angeles 13, Calif. In Canada: United Chromium Limited, Toronto, Ont.

HOW DO YOUR CUTTING OIL COSTS COMPARE WITH ANTISEP ALL PURPOSE BASE?

Chances are you're paying much more than 8¢ per gallon in the machine... the average cost of Antisep All-Purpose Base. And Antisep All-Purpose Base also gives you these extras:

....*VERSATILITY*
one cutting fluid to do 90% of all jobs

....*LUBRICITY*
to withstand pressure and reduce friction

....*ANTISEPTIC PROPERTIES*
no skin sores, no rancid odors

....*FILM STRENGTH*
which gives you longer tool life

....*COOLER WORK*
which can be handled bare-handed

THIS ANTISEP USER CUTS 80% OFF COOLANT BILL AND INCREASES TOOL LIFE 83%!

Broaching internal 1¼" I.D. spline on prop shaft tube coupling of SAE 4135 steel, this customer saved $699.60 on oil costs since changing to Antisep A.P. Base. One part Antisep to 20 parts plain water was used. Straight cutting oil formerly used cost 54c per gallon. User reports cleaner operation, too, with less handling of oil. In addition he reports, "We now get 1100 pieces per broach grind with Antisep, instead of the 600 our straight cutting fluid gave us!"

ANTISEP

ALL-PURPOSE BASE

—not a mere water soluble oil, but a fortified concentrate scientifically developed to give you "100 oils in one!"

E. F. HOUGHTON & CO.

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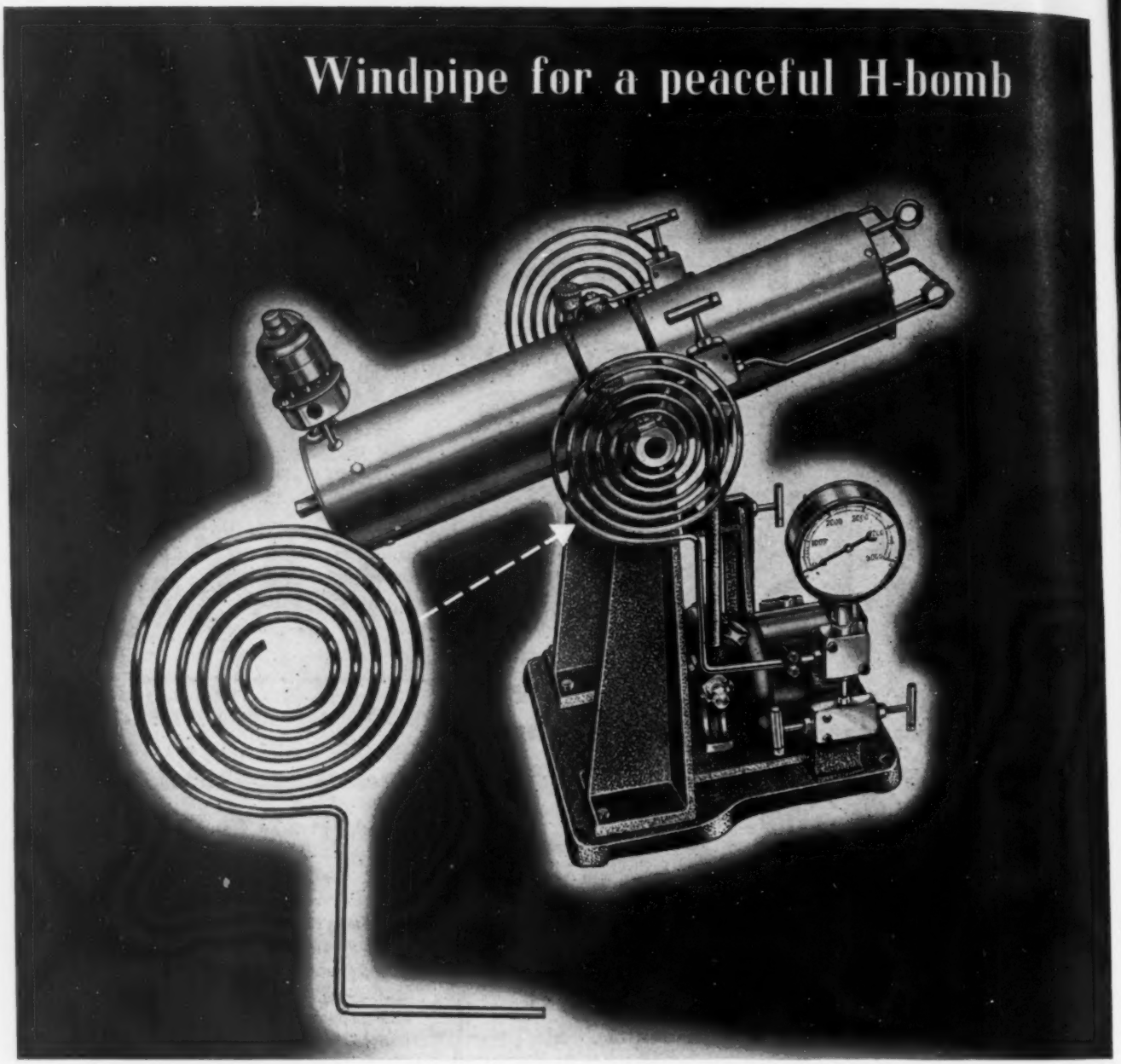
Windpipe for a peaceful H-bomb



You can call it an H-bomb if you like. Some people do. Technically, it *is* a hydrogenation bomb or, simply, a super-pressure vessel. Uses for it are legion but not warlike.

Researchers in rubber, plastics, pharmaceuticals, petroleum, and solvents pilot their hydrogenation, oxo-reaction, polymerization and other jaw-breaker problems in its gizzard—under high pressure.

To speed-up chemical reactions, the vessel is rocked 38 times a minute. Pressurizing a see-sawing chamber is in itself a neat trick: when pressures of the order of 60,000 p.s.i. are required you might become discouraged or concerned.

American Instrument Company, Inc., maker of Super-pressure equipment, introduces the pressure through a spiral windpipe. They had some trouble through tube breakage but that was before they tried Superior 304 Cold-drawn Seamless Stainless Steel Tubing. Superior gives them just the flexibility and fatigue strength needed for cyclic operation, plus chemical resistance and burst pressure to spare. Spirals of Superior 304 are easier to bend, last longer. And American Instrument reports them dimensionally uniform, smooth and free from surface imperfections.

If you haven't found small tubing in the analysis, size, and finish you want, or if you think there's little difference in tubing or tubing experience, Superior invites your inquiry. Superior Tube Company, 2004 Germantown Avenue, Norristown, Pennsylvania.

Round and Shaped Tubing available in Carbon, Alloy, and Stainless Steels; Nickel and Nickel Alloys; Titanium, Zirconium, and Beryllium Copper

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THE BIG NAME IN SMALL TUBING

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. UNderhill 0-1331

All analyses .010" to ⅝" O.D.
Certain analyses (.035" max. wall) up to 1⅜" O.D.

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ANGLE BENDING ROLLS
3x3x⅜" Bertsch Angle Bending Roll
4½x4½x⅝" Amplex Horiz. Angle Bending Roll

BALER—SCRAP METAL
Lagemann 7-PH Baler, Chamber 60" long by 18" deep x 16½" wide. Finished Bundle 60-90 lb.

BENDING ROLLS
6' x ¼" Milton Initial Type Bending Roll
14' x 1¼" Hement Miles Initial Type Bending Roll
10' x ⅝" United Pyramid Type Bending Roll
20' x 1" Southwark Pyramid Type Bending Roll

BRAKES—LEAF TYPE
8'x⅛" Dreis & Krump Size 186
8'x⅛" Dreis & Krump Size 188
12'x½" Dreis & Krump, Motor Driven
18'x⅜" K.C. Leaf Type Brake, Hydraulic

BRAKES—PRESS TYPE
6'x⅜" Dreis & Krump Press Brake, V-belt Drive
10'x⅜" Cincinnati Series 130—NEW 1950
12'x3/16" Cincinnati Series 90—NEW 1949
12'x½" Cleveland Steelweld Press Brake L-5½-10

CRANES—LOCOMOTIVE
25 ton Industrial Brownhoist Locomotive Crane with Cummins 6-cylinder Diesel Engine
25 ton Link Belt Gasoline Powered Locomotive Crane. With Clam Shell Bucket

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton Robbins Myers	28'6" Span 220/3/60
5 ton Northern	30' Span 230 Volt D.C.
10 ton Northern	30' Span 230 Volt D.C.
10 ton Northern	42' Span 440/3/60 A.C.
15 ton P & H	97' Span 115 Volt D.C.
With 220/440/3/60 Motor Generator	
15 ton Shaw	69' Span 230 Volt D.C.
20 ton P & H	56' Span 230 Volt D.C.
20 ton Toledo	75' Span 550/3/60 A.C.
25 ton P & H	26' Span 440/3/60 A.C.
25 ton P & H	37' Span 440/3/60 A.C.
30 ton Cage	48'7" Span 230 Volt D.C.
With 5 ton Auxiliary	
125 ton Cleveland	64'6" Span 220 Volt D.C.
With 2 Trolleys 62½ Ton & 10 Ton Aux.	

DRAW BENCH
100,000# Poole Draw Bench, Max. Length bar 39' With draw up to 4½" max. round

FLANGING MACHINE
¾" McCabe Pneumatic Flanging Machine, Pneumatic Holddowns

FORGING MACHINES
1½", 2", 3", 4", 5", 7", Ajax
1", 2", 3", 5", Acme
4" National

5" AJAX—AIR CLUTCH

FURNACES—MELTING
1 ton Electric Melting Furnace—Top Charge
6 ton Pittsburgh Meltg. Furnace—Top Charge

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING—800 lb. to 8,000 lb.

LEVELERS—ROLLER
54" Aetna Standard Leveler, 17 Rolls 4¾" Dia.
66" Aetna Standard Leveler, 17 Rolls 4-⅝" Dia.
72" Aetna Standard Leveler, 17 Rolls 3-⅝" Dia.
72" Sutton Roller Leveler 17 Rolls 2⅝" Backed-up

PRESSES—HYDRAULIC
75 ton Beatty Gap Type, 20" Stroke, Table 40" x 40"
500 ton Southwark Hydraulic 24" Stroke, 78" Daylight Platen 64" R to L x 32" F to B
750 ton HPM Hydr. Press Type CU-3. Pressing Surface 38" x 105"
1500 ton Southwark 4-Column Press, 36" Stroke Distance Between Columns 30¼"x44¼"
1200 ton Loewy Hydr. Extrusion Press
3000 ton United Steam Hydr. Forging Press

PRESSES—STRAIGHT SIDE
No. 3 Ferracute Super Speed Punch Press 30 ton Capacity. NEW 1946—never used
#300-D2-132T Verson Double Acting Press, 134 Between Uprights, Stroke of Blankholder and Die Holder 20"

PRESSES—TRIMMING
No. 204 Bliss 50 ton capacity, with Side Shear Stroke 4" Bed area 22" x 19"
No. 204½ Bliss 7 ton capacity, with Side Shear Stroke 4". Bed area 24" x 23"

PUNCH—BEAM
#9 Beatty Guillotine Beam Punch. For punching flanges & webs of beams 6" to 20"

PUNCH & SHEAR COMBINATION
Webb #4 Steelworker, Motor Driven. Capacity Punch 1" thru ½"- 1¾" Round, 1¼" Square, etc.

ROLLS—PLATE STRAIGHTENING
98" Hilles & Jones, 6 Rolls 13⅞" Dia.
90" National, 17 Rolls 7⅝" Dia.
76" National, 17 Rolls 7" Dia.

ROLLING MILLS
7½" Steckel Four High Rolling Mill
8"x10" Schmitz Single Stand Two High
12"x16" Waterbury Farrel Temper Mill
12"x16" Waterbury Farrel 2-High Cold Mill
18"x24" Waterbury Farrel Two Stand Two High
20"x36" Poole Two Stand Two High
22"x40" Single Stand Two High
18"x60" Three High Roughing Mill

SHEAR—ANGLE
6x6x⅝" Hilles & Jones Double Angle Shear

SHEARS—SQUARING
6'x3/16" Bertsch
10'x3/16" Dreis & Krump
12'x3/16" Cincinnati Model #1412

SLITTERS
16" Yoder Slitting Line, Complete with Coiler and Electrical Equipment
24" Torrington Heavy Duty Slitter
120" Stamco Sheet Slitter

SWAGING MACHINE
No. 7 Langelier Swager, Capacity Tubing 3⅛", Solid Cold 2¾", Solid Hot 3"

STRAIGHTENERS
No. 3 Kane & Roach Shape Straightener, M.D., Capacity 1⅜" Round, 2½ x 2½ x ¼" Angles, 2⅝" Channels, etc.
Sutton Shape Straightener 9-Roll, Capacity 3" Angles, 2" Squares, 2½ x ⅜" Flats, etc.
No. 1 Medart 2-Roll Straightener, Capacity ⅛" to 2-¼" dia. bars any length

No. 3 MEDART THREE ROLL ROTARY STRAIGHTENER, CAPACITY 1" to 3½" bars or up to 4½" OD PIPE

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10,000 lb Riehle Bros. Universal
50,000 lb Southwark Tate-Emery Universal
60,000 lb Olsen Type "L" Universal hydraulic
100,000 lb Riehle Universal, Motor Driven

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2500 KVA Transformer 13,200 Primary, Secondary 90 to 225 Volt
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VERTICAL BORING MILLS
42" Bullard Spiral Drive, m.d.
42" Bullard New Era, m.d.
42" King, with side head and plain swivel head on rail
44" Putnam, m.d., p.r.t.
44" Niles, m.d., p.r.t.
48" Colburn, m.d.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
53" Niles Heavy Pattern, m.d., p.r.t.
73" Niles, m.d., p.r.t.
100" Niles Heavy, m.d., p.r.t.
102" Niles Wheel Turning Boring Mill
12' Niles, m.d., p.r.t.
108" Cincinnati Vertical Hypro Vertical Boring Mill

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75 H.P. LaPointe Hydraulic Broach, m.d.
Cincinnati Mill Broach, m.d., 10" spindles, new
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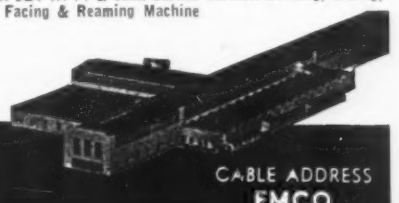
2½"-10" col. American Triple Purpose Plain, m.d.
3'-13" col. Cincinnati-Bickford Super-Service, m.d.
3½'-10" col. American Triple Purpose Plain, m.d., box table
4'-11" col. Cincinnati-Bickford, m.d.
4'-13" col. Cincinnati-Bickford Super-Service, m.d.
4'-13" col. American Triple Purpose Plain, m.d.
5'-13" col. American, gear box, m.d.
5'-14" col. Carlton, m.d.
5'-15" col. American Triple Purpose, m.d. on arm
7'-16" col. American Triple Purpose, m.d.
8'-17" col. Dreses, gear box, m.d.
8'-19" col. Cincinnati-Bickford Super Service, m.d.
Zewo Precision Universal Bench Type Radials, m.d., new
Baush Radial Drilling & Tapping Machine, m.d.

BALL BEARING DRILLS
No. 15 Buffalo, Floor Model, m.d.
No. 18 Canedy-Otto Bench Model, m.d.
Providence Engineering Co. Model E, s.p.d.
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new
No. 2MS Edlund, single spindle, m.d.
No. 4 Fosdick, 8" overhang, belted m.d., No. 2 Taper
1 spindle Allen, belted m.d.
2 spindle Allen, belted m.d., 8" overhang
No. 3 Allen, belted m.d.
No. 2LMS Leland-Gifford, single spindle, High Speed, m.d.
2 spindle Avey, size No. 1, type B, style VHP, m.d., 8" overhang
2 spindle Avey, No. 2, 3, belted, m.d., p.f.
2 spindle #2 Leland & Gifford High Speed, 8" overhang, m.d.
No. 1LMS—3 spindle Leland & Gifford High Speed, late, m.d.
3 spindle Leland & Gifford High Speed, Model 3MS, m.d.
4 spindle Avey #1 High Speed, m.d., 7½" overhang, No. 2 M.T.
4 spindle No. 3 Avey, belted m.d., No. 3 Taper, 12" overhang
4 spindle Leland & Gifford, m.d.
6 spindle Leland & Gifford, No. 2 Taper, m.d. on each spindle
6 spindle Henry & Wright, m.d., 15" overhang, No. 2 Taper
6 spindle No. 1 Avey, belted m.d.
No. 4B-12 Edlund, m.d., No. 3 M.T.

HORIZONTAL DRILLS
Natco Horizontal Production Boring Machine, m.d., with D-11-HU heads
3 way Natco Horizontal Drill, consisting of 3 E13 Hole Units
No. ½B x 30" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d.
No. ½B x 50" Pratt & Whitney Gun Barrel Rifling Machine, m.d., latest
No. 1B x 74" Pratt & Whitney 2 spindle Deep Hole Reaming Machine, m.d., latest
No. 1½ x 105" Pratt & Whitney 2 spindle Deep Hole Drill, m.d., latest
No. 1½ x 105" Pratt & Whitney 2 spindle Gun Barrel Rifling Machine, m.d.
No. 1 Pratt & Whitney 2 spindle Deep Hole Drill, belted m.d.
Special Horiz. Drill. Machine, Cinti. Bickford Head mounted horiz. on base

MULTIPLE SPINDLE DRILLS
No. 115U Moline Multiple Spindle Drill Press
No. 3 Baush, m.d., 16 x 30" head
No. 3 Baush, m.d., 20 x 40" head
No. 16 Foote-Burt Fixed Center, m.d.
3 spindle Rockford Gang Drill, m.d.
3 spindle 24" Barnes All Geared Self-Oiling, m.d.
3 spindle 28" Cinti. Bickford Upright Drill, m.d., No. 4 Morse Taper
4 spindle Niles-Bement-Pond, m.d., 12' rail, No. 5 Taper
No. 924 W. F. & John Barnes Vertical Drilling, Boring, Facing & Reaming Machine

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.



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1002 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

THE CLEARING HOUSE

CIMCO MACHINE TOOLS AT BARGAIN PRICES

Bullard 54" Vertical Boring Mill, Spiral Drive, 4 jaw chuck table
King 42" Vertical Boring Mill, 2 heads
Niles 36-44 Vertical Boring Mill, motor driven, 1 rail and 1 side head
Niles 42"-50" Burnisher, Facer and Box Borer, late type
H P M 750 ton Triple Action Hydraulic Press, late type
Niles 12' x ¾" capacity Initial Type Bending Roll, motor driven with 40 HP slip ring motor
Potter & Johnston 8 DRE Automatic Chucker and Turning Machine, v-belt drive, Timken bearing, hardened ways.
Norton 10 x 24 Surface Grinder
American 5'14" Triple Purpose Plain Radial Drill
Fosdick 6'15" Radial Drill
Foot Burt 3 Spindle Drill Press, individual motor driven spindles, new 1947
Fellows 612 Spur Gear Shaper
Fellows 725 Gear Shaper with Spur Guide
Cincinnati 24" Back Geared Shaper
Columbia 28" Back Geared Crank Shaper
Gould & Eberhardt 16" Back Geared Shaper
Gould & Eberhardt 24" Back Geared Shaper
Gould & Eberhardt 28" Back Geared Crank Shaper
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Gould & Eberhardt 60BM Gear Rougher
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Heald #72A3 Internal Plain Grinder
Heald 78 Centerless, Internal & Cylindrical Grinder
Jones & Lamson 8 x 31 Thread Grinder
Landis 26" x 168" Plain Cylindrical Grinder
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Oliver Template Tool Bit Grinder
Sellers 4T Tool Grinder, late type
Sellers 6T Tool Grinder, late type
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Oster 601 Rapiduction Turret Lathe
Lodge & Shipley, 16" x 6' G.H. Lathe, 12 speeds
Lodge & Shipley, 18" x 6' G.H. Lathe, 12 speeds
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Milwaukee 2H Plain Mill, late type
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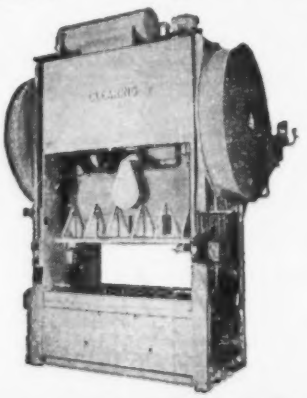

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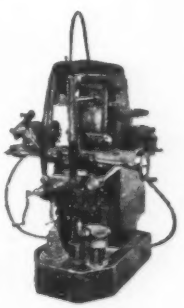

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1150	G.E.	New 3-unit	
250	Cr. Wh.	CCD	1200
2-125	G.E.	MPC	1200

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KW	MAKE	TYPE	SPEED
1250	G.E.	MCF New	720
425	G.E.	MPC	1200
3-400	G.E.	MPC	720
250	G.E.	CD	1200

230 V. DC MOTORS

HP	MAKE	TYPE	SPEED
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1	1100	Whse.	720	600	2300
1	1000	Whse.	514	600	11000/6600
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1	500	C.W.	720	575	2300
1	400	C.W.	720	250	2300
1	400	C.W.	1200	125/250	440/2300
1	300	Whse.	1200	275	2300
1	250	Whse.	1200	125/250	440/2300
1	240	Whse.	1200	275	4000/2300
1	240	Whse.	1200	125/250	4000/2300
1	200	Whse.	1200	600	4000/2300
1	150	Whse.	1200	125/250	440
1	135	G.E.	720	250	2300/440
1	100	Ridgway	1200	275	4000/2300
1	100	C.W.	1200	125	440/220
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1	25	Ideal	1750	125	440/220
1	25	Al. Ch.	1200	250	440/220
1	20	Al. Ch.	1200	250	440/220
1	22½	Whse.	1200	125	440/220
1	15	G.E.	1200	120/240	440/220

Any of these sets can be furnished with D.C. panels and starting equipment.

SLIP RING MOTORS
Constant Duty, 3 phase, 60 cycle type

Qu.	HP	Make	Type	Volts	RPM
1	1800	G.E.	MT-498	2300	257
1	1200	G.E.	MT-26	2200	277
3	800	G.E	MT	2200	440
1	700	G.E.	I-M	2300	400
1	600	G.E.	MT-20	2300	360
1	500	Al. Ch.	ANT	2200	514
1	500	G.E.	I-16-M	2300	450
3	400	G.E.	MT-412	2200	480
1	250	Whse.	CW-937	440	1200
1	250	G.E.	MT-414	2200	600
1	150	Al. Ch.	ART	440	720
1	100	G.E.	I-15-M	2300	514

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1	3000	Whse.	80	4800/2400	720
2	2100	G.E.	100	2300	360
2	2000	G.E.	80	2300	720
3	1750	G.E.	100	2200	3600
1	750	G.E.	80	2300	450
1	710	G.E.	80	2300	720
2	600	G.E.	80	2300	600
1	250	G.E.	100	2300	514
2	200	Whse.	80	440	1200
1	187	G.E.	80	440	720
1	150	G.E.	100	2200	900
1	150	G.E.	100	550	600
1	150	Whse.	80	440/220	450
2	125	G.E.	80	4000/2200	1200
3	125	El. Mchy.	100	4800/2400	900
1	125	G.E.	8	2200	900
2	100	Whse.	8	440	1800
1	100	Ideal	8	440/220	900
3	100	G.E	8	440/220	600

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Qu.	HP	Make	Type	RPM
1***	3000	Whse.	Encl. (Rev.)	600
1***	2400	Whse.	Encl. (Rev.)	600
4***	1500	Whse.	Encl. (Rev.)	600
4***	1200	Whse.	Encl. (Rev.)	600
4***	800	Whse.	Encl. (Rev.)	600
1***	1000	Whse.	Mill	66/74
10**	700	Whse.	Mill	285/720
1***	1000	G.E.	MCF-80	350/450
1	350	G.E.	CD-169	1150
1**	250	G.E.	MPC-4	325/975
1**	200/250	El. Dy.	Size 22	400/1200
1**	200	Whse.	Mill	300/1200
1**	200/250	G.E.	MPC	300/900
1**	180	G.E.	MPC	190
1***	125	Whse.	SK-190	600
1**	90/180	G.E.	MPC	625/1125
2	125	Whse.	SK-184	575/850
1	75	G.E.	CD-133	500/1000
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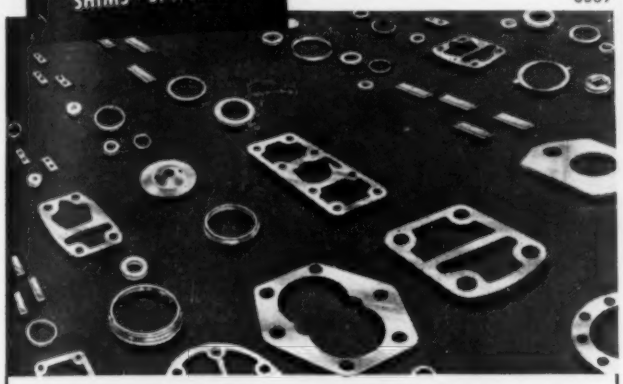

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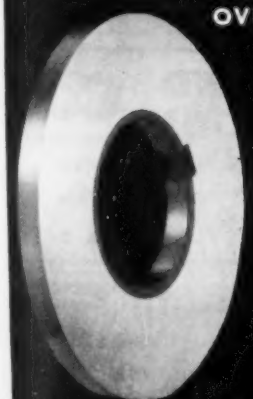

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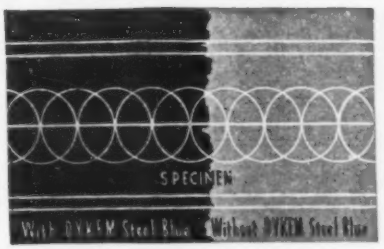

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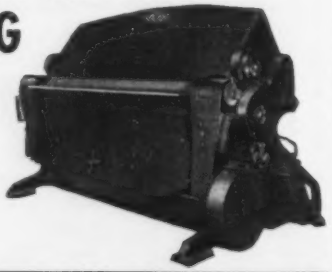

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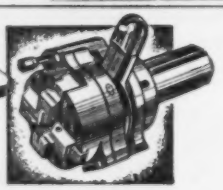

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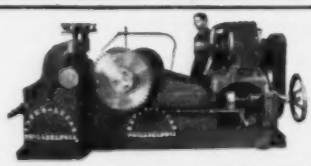

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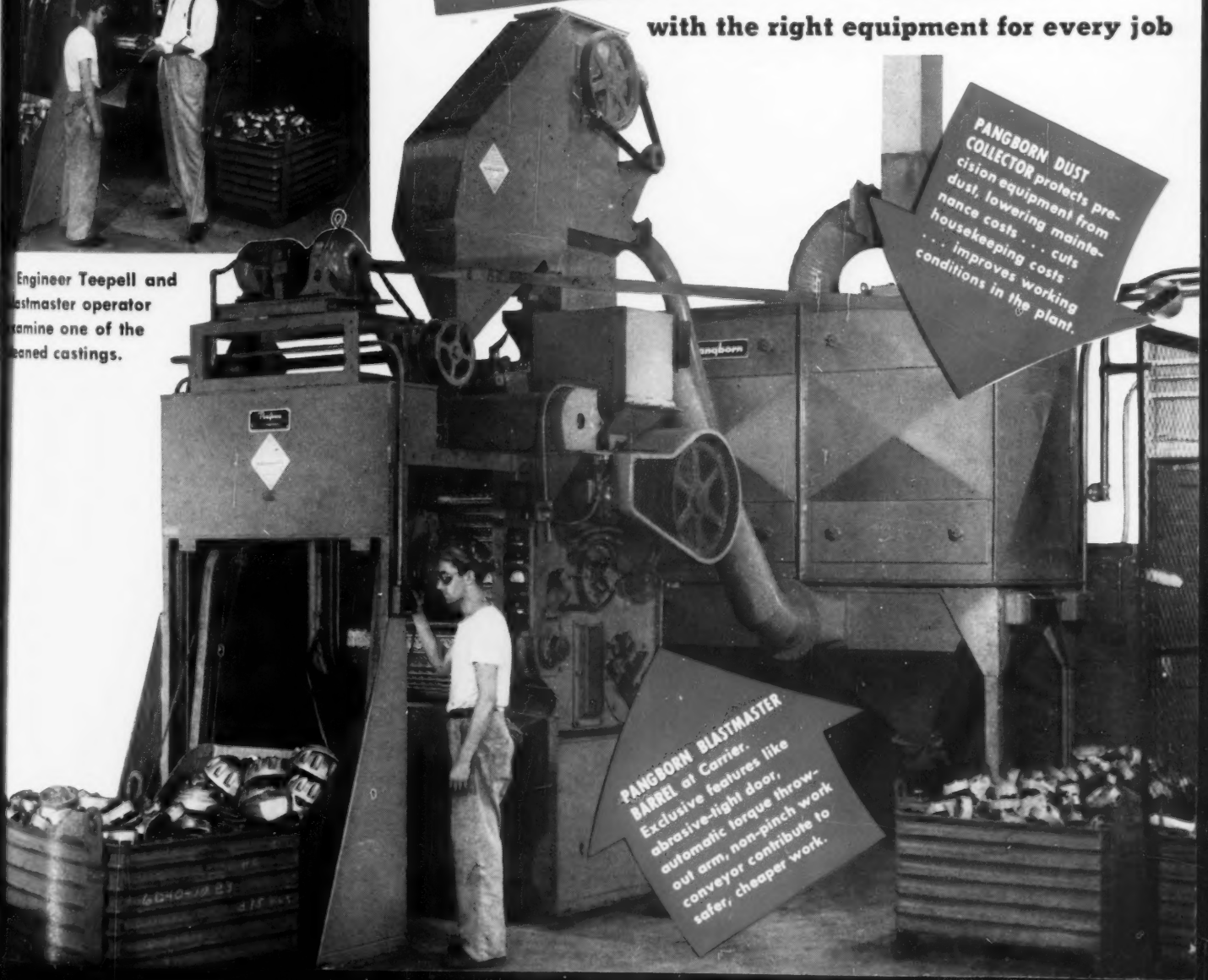
Engineer Teepell and Blastmaster operator examine one of the cleaned castings.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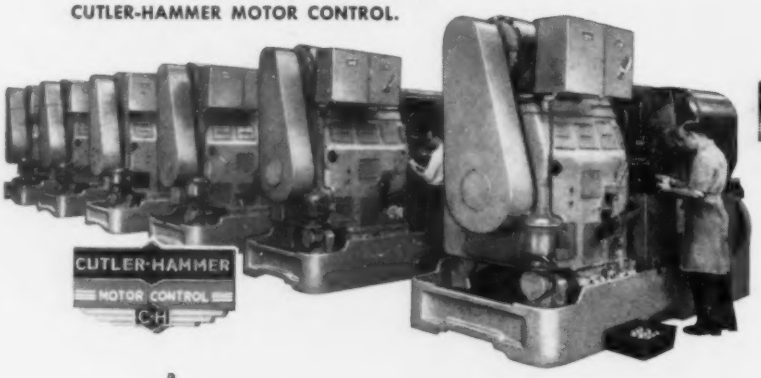

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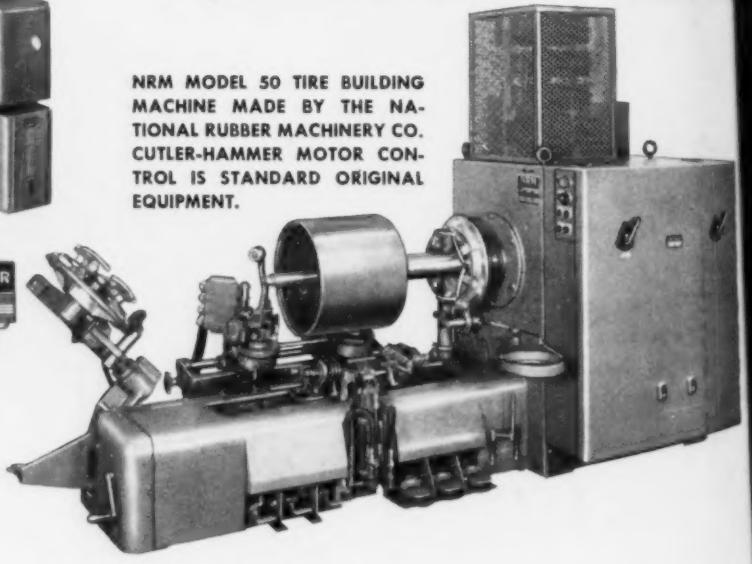

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